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A COST-BENEFIT ANALYSIS OF A MILITARY THRIFT SAVINGS PLAN

by

Richard G. De Guzman

December 2000

Principal Advisor:	John E. Mutty
Associate Advisor:	Shu S. Liao

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A COST-BENEFIT ANALYSIS OF A MILITARY THRIFT SAVINGS PLAN

Richard G. De Guzman
Major, United States Marine Corps
B.S., United States Naval Academy, 1989

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ABSTRACT

The transition from defined benefit to defined contribution retirement plans represents the most significant change in both the private sector and civil service employee retirement systems in the last twenty years. The Thrift Savings Plan (TSP), a tax-deferred, defined contribution plan for federal civilian employees, was established in 1986 as part of the Federal Employee Retirement System. This thesis discusses the costs and benefits of a TSP plan for the uniformed services. The objective of the research addresses the costs of a military TSP. Government studies, periodicals, and the Internet were examined to identify the strengths and weaknesses of the federal TSP. Next, a probabilistic spreadsheet model using Monte Carlo simulation was developed to forecast deferred tax revenue, which represents the most significant cost associated with a military TSP. An analysis of the results indicates that the simulations come within 2.6 percent of the initial Department of Defense's forecast. On October 30, 2000, the National Defense Authorization Act for fiscal year 2001 was enacted. This act included a military TSP called the Uniformed Services Payroll Savings Plan. It is recommended that future cost estimates use probabilistic spreadsheet modeling to provide more relevant information to the decision making process.

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ACKNOWLEDGMENT

I would like to dedicate this course of work to a fallen comrade who passed away while attending the Naval Postgraduate School. Lieutenant Colonel Tom Baker, USMC, and I only shared one class together, but through it, we and fellow classmates, developed a quick and lasting friendship. He and his family will be in my prayers and thoughts always. I would also like to thank my professors, whose professionalism and experience made this research effort a reality. Lastly, I would like to thank my wife Marie, whose extraordinary strength, patience, and flexibility have always inspired me through the tough times.

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I. INTRODUCTION

A. PURPOSE

The purpose of this research is to assess and evaluate the feasibility of instituting a Defined Contribution (DC) retirement plan similar to federal civilians' Thrift Savings Plan (TSP) into the current military retirement system. The objective of the research is to determine the costs of a DC program. To accomplish this primary goal, the thesis research discusses four related subjects: (1) An analysis of the current military retirement system, (2) Current retirement features between defined benefit programs and defined contribution programs, (3) Building a spreadsheet model that addresses the TSP costs if it is adopted for the military, and (4) Costs or benefits associated with a military TSP.

B. BACKGROUND

With the growing popularity of 401(k) pensions of private companies, the military may benefit from instituting a Defined Contribution (DC) retirement program similar to the Thrift Savings Plan (TSP) of federal civilian employees. The goals of a military TSP would be to provide a long-term savings vehicle and to provide retirement income after military service. The implementation of a DC plan along with the existing defined benefit retirement plan gives more flexibility and implies greater responsibility for the service member. Conversely, a military TSP may also affect current military retirement policies and regulations.

The present military retirement system, with some modifications since 1947, provides an excellent example of a defined benefit program. A Defined Benefit (DB) plan is a traditional program that stresses loyalty to the firm or organization. Yet, the DB plan has come under scrutiny because of its lack of flexibility. Its strongest advantage to a service member is an immediate pension that is received after putting in 20 years of service to the country and the Department of Defense (DoD). Its perceived disadvantage is that the service member must perform 20 years of service to a single organization prior to receiving any benefits. This presents a controversial issue known as vesting, and will be examined in this thesis.

With the implementation of the TSP for federal civilians in 1986, military service members have started to reassess their own retirement plans. TSP represents a defined contribution plan, which also has advantages and disadvantages. Some advantages are tax-deferrals, the employer directly matching (or a percentage of) the employee's contributions, and portability. Vesting and portability are related, but vesting takes place first. Vesting in an organization allows an employee to become entitled to receive retirement or pension benefits. Vesting is based on the number of years – normally five years that an employee works in the organization. After becoming vested in an organization, the employee is now eligible for those DC retirement benefits if he or she changes jobs. Basically, portability means the 401(k) or DC plan goes with you if you change jobs. Yet, a significant drawback to a DC plan also involves portability. One of the options an employee has when leaving the organization is the ability to withdraw the

retirement contributions and cash out. Often this translates into a buying spree, which potentially could reduce that long-term savings plan or retirement nest egg to nothing. [Ref. 1:p. 49]

Congress authorized military participation in the Thrift Savings Plan in the Defense Authorization Bill for FY2000. However, since funding for TSP was not available at that time, the military TSP never moved forward. Additionally, the TSP was not in President Clinton's FY2001 original budget, but has been added through the assistance of Senator John Warner (R-Virginia), the Chairman of the Senate Armed Services Committee, and Senator Pete Domenici (R-N.M.), the Chairman of the Senate Budget Committee during the FY2001 Concurrent Budget Resolution. Senator Domenici's staff analysts developed a budget that included the TSP, and its funding would be resourced from an anticipated budget surplus. [Ref. 2:p. 15]

The budget process for fiscal year 2001 begins with the President's budget plan in February 2000. The processes continued with the Concurrent Budget Resolution in April 2000, followed by Authorization Committees, Appropriation Committees, and finally back to the President for final approval. Recently signed into law on October 30, 2000, the National Defense Authorization Act for fiscal year 2001 included the military TSP despite disagreements within the branches of government and also within the services of the DoD. The military version of the TSP is titled the Uniformed Services Payroll Savings Plan or USPSP, and incorporates the same basic functions of the federal employees' TSP, however, there is no employer (government) matching. The only

exception to government matching is available with bonus or special type pay, and this authority to grant government matching is up to the discretion of the respective Secretary's of each service.

This research will develop a DC model based on federal civilians' TSP. Additionally, since TSP began in 1986 – it has evolved and improved substantially. Therefore, it is intended that the military TSP model will capture the lessons learned and apply them appropriately. As mentioned earlier, the military TSP may change current military retirement policies. If military retirement does change due to the military TSP, such legislation would definitely affect the decision-making behavior of existing military personnel.

C. SCOPE AND LIMITATIONS

First, an examination of existing cost data of the TSP as part of the Federal Employee Retirement System was carried out. These cost data were obtained from the Department of Defense Directorate of Compensation and the Congressional Budget Office (CBO). Further, a probabilistic approach for retirement forecasts was calculated using spreadsheet modeling and Monte Carlo simulation.

D. RESEARCH QUESTIONS

1. Primary Question

What are the estimated costs of instituting a thrift savings retirement plan?

2. Subsidiary Questions

- Under the TSP offered in the FY2001 Concurrent Budget Resolution (CBR), how would this TSP be funded?
- Under the TSP offered in the FY2001 CBR, what incentives are provided to the service member (officer and enlisted) to participate in the military TSP?
- What existing aspects of the federal TSP can apply to the military (employer/government matching, investment choices, grandfather clause, roll over contributions)?
- How would a military TSP change the current defined benefit retirement system?

E. METHODOLOGY

The methodology of this thesis includes the following steps: (1) Literature: review of the military retirement system and the TSP. Previous government studies – General Accounting Office, Congressional Budget Office (CBO), and RAND were examined. (2) Interviews: Interviews with key managers involved with military retirement and compensation, and the TSP. Interviews concentrated on cost data and funding resources. (3) Data Collection: Archival cost data were collected from CBO and the DoD. The focus of data collection was on compiling current cost information. (4) Analysis: First, a cost-benefit analysis of federal civilians' TSP was carried out. Next, a model for a military TSP was developed. The military TSP was based on and adapted from the federal civilians' TSP. The military TSP will attempt to streamline the federal civilians' TSP in order to determine cost savings.

F. ORGANIZATION OF THE STUDY

Chapter I. Introduction. Identifies the purpose of the thesis and provides a discussion of a military 401(k).

Chapter II. Retirement Systems. This chapter provides a background and evolution of military retirement into its current form. The chapter also discusses federal civilian employee retirement, better known as the Federal Employee Retirement System (FERS).

Chapter III. The Thrift Savings Plan. Chapter III discusses the history of Thrift Savings Plan and how the plan applies to FERS workers. While the advantages and disadvantages of this defined contribution plan are reviewed here, there are also numerous options available to the participants in the plan.

Chapter IV. The USPSP. Chapter IV transfers the template of the federal workers' TSP to the members of the uniformed services. This military model of the TSP is titled the Uniformed Services Payroll Savings Plan or USPSP. The uniformed services primarily represent the DoD, and a cost-benefit comparison similar to Chapter III was carried out here.

Chapter V. Data Analyses. An analysis of a portion of the DoD cost estimate is conducted in order to demonstrate the value of using a probabilistic approach (Monte Carlo simulation) vice a deterministic approach.

Chapter VI. Conclusions and Recommendations. The final chapter summarizes findings from the research and provides recommendations for future research.

G. BENEFITS OF STUDY

Developing a TSP modeled for the military influences several areas. In regard to implementation, determining costs represents a critical decision point for government and military leaders. Also, if a military TSP is authorized, what changes, if any, need to be made to the current defined benefit retirement plan? Finally, a military TSP may be used as a force management tool, and could influence DoD policy makers and service members in regard to recruiting and retention. As a result, some recommendations of this research will be forwarded, as they are applicable.

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II. RETIREMENT SYSTEMS

A. INTRODUCTION

An efficient and successful organization recognizes its core strengths. Specifically, the organization's management must value its people as one of its highest priorities. In defense terms, no matter how powerful a nation's military - no amount of strategy or technology can make up for a shortfall of quality personnel. To continue being successful, the organization's employees must receive some incentives to remain in place. Basic pay or salary, cash bonuses, promotion and some form of retirement compensation represent some of the incentives that prompt individuals to continue working for the organization.

Prior to developing and understanding a model of any retirement compensation system, a discussion of the existing retirement systems is warranted. This discussion allows a thorough understanding of the reasons and motives that currently drive retirement programs. Specifically, Congress and the Department of Defense (DoD) are the major influences upon federal and military retirement systems.

The objective of this chapter is to describe two current retirement compensation systems and their effects on the decision-making of an individual employee. The two retirement systems are the Military Retirement System and the Federal Employee Retirement System. The Military Retirement System applies to service members of the Department of Defense (DoD) and also the employees of the Coast Guard, the Public

Health Service, and the National Oceanic and Atmospheric Administration. The second system impacts federal civilian employees. This system, also known as FERS, was formerly called the Civil Service Retirement System (CSRS). In this chapter, an overview of the two retirement systems' histories, purpose and fundamentals, and current issues will be explained.

B. MILITARY RETIREMENT SYSTEM

1. History

The modern Military Retirement System was established in 1947, when a common system was implemented for both enlisted personnel and officers. The military's retirement system can best be described as a defined benefit plan, which is generally noncontributory and fully funded. Noncontributory means the employee places none of his or her income towards the program and the employer assumes the responsibility for resources toward the pension or retirement program. While over 80% of retirement funding goes toward nondisability pay, military retirement also finances disability pay, survivor annuity programs, and Reserve retirement pay. [Ref. 1: p. A-2] This section will focus on nondisability pay.

In 1998, according to *The Valuation of Military Retirement System*, the purpose of military retirement is guided by five principles:

- That service in the military remains competitive with the private sector
- That promotion opportunities are available in order to maintain a younger active duty force

- That the welfare of the service member is stable after he or she retires from the military
- That a resource of experienced military personnel is available during war or emergencies if they need to be recalled to active duty
- That costs fall within reason

These five principles reflect the nature and development of the military retirement system. For example, in 1870 officers were allowed voluntary retirement after 30 years and held retirement pay at an upper threshold of 75 percent, which demonstrates the main beliefs of a stable way of life after the military, and that promotion opportunities exist that ensure a younger military service.

Other significant retirement milestones influenced military retirement. In 1916, the "up or out" policy was enacted for those service members who were ineligible for further promotion and were subsequently retired. In 1948, the Army and Air Force Vitalization Act standardized the minimum time period for voluntary retirement at 20 years for all services. [Ref. 3:p. B-4]

During a period of deficit spending in the 1980s, the government looked for innovative approaches to cut defense spending. Specifically, three Congressional documents targeted the reduction of military retirement. There are currently three military retirement programs that remain as a legacy of these acts.

a. Final Basic Pay

Service personnel who entered the military prior to September 8, 1980 fall under the Final Basic Pay category. Upon completing at least 20 years of service (YOS),

they receive the traditional 50 percent of basic pay for the rest of their lives. The formula to calculate retirement pay is based upon a multiplier of 2.5 percent for each year of active service (e.g. 2.5% x 20 years = 50%). The maximum percentage that can be achieved is 75 percent at 30 years of service. Additionally, retired pay is protected from inflation through annual Cost of Living Adjustments (COLA). COLA's for the Final Basic Pay category equal the annual Consumer Price Index (CPI). Final Basic Pay provides the highest annual stipend of the three retirement systems.

b. High Three

The Department of Defense Authorization Act of 1981 introduced the "High-3" system, which affects personnel who entered the military during the period September 8, 1980 to July 31, 1986. High Three parallels Final Basic Pay, where retired pay is based on an average of the highest three years of basic pay and uses the same 2.5 percent multiplier for the 20 to 30 YOS. High Three also includes the same COLA indexed to the CPI. The High Three category is not as generous as Final Basic Pay.

c. Military Retirement Reform Act of 1986

Better known to service members as REDUX, the Military Retirement Reform Act was designed to further cut retirement costs and to provide some incentive for military personnel to carry out 30 years of active service. Applicable to personnel who entered the service after July 31, 1986, REDUX also uses the High Three formula for determining basic pay, but the multiplier of 2.5 percent is reduced. To calculate retired pay under REDUX, 2.5 percent is multiplied by 20 YOS and then reduced by 1

percent for each year under 30 YOS. The following example shows the calculation for 20 years of service:

(2.5% times 20 years) – (1% times 10 years) = 40%

While REDUX is significantly less than Final Basic Pay, further reductions apply. For REDUX personnel, COLA is calculated at CPI minus 1 percent prior to age 62. At age 62, COLA is once again equal to CPI with a one-time opportunity for restoration. With the smallest annual payout of the retirement programs, REDUX reflected increasing financial pressure within Congress to reduce growing retirement costs and still maintain appropriate manpower and readiness levels within the Department of Defense. Table 2.1 provides examples of the monthly retired pay under the three military retirement systems that are available. Military pay tables effective on January 1, 2000 were used for calculations:

Grade at 20 YOS	Final Pay	High-3	Redux
E-6	$1,138	$1,138	$911
E-7	$1,300	$1,289	$1,039
E-8	$1,473	$1,461	$1,178
0-4	$2,392	$2,392	$1,914
0-5	$2,765	$2,711	$2,212
0-6	$3,057	$3,013	$2,446

Table 2.1 Monthly Retired Pay Under The Three Current Military Retirement Systems in January 2000. Source: Adapted from the January 2000 Military Pay Chart.

The National Defense Authorization Act for FY2000 affected personnel entering the military after July 31, 1986. The most significant point of the legislation was the repeal of the controversial REDUX Act, and the restoration of the retirement stipend

to 50 percent of basic pay using the High Three formula. Additionally, the annual COLA matched the CPI and was equivalent to the Final Basic Pay and High Three categories. Another noteworthy point gave personnel at the fifteenth year of service the option of receiving a $30,000 bonus. This bonus was designed as a retention incentive and was contingent only if they chose the retirement system under REDUX and carried out their twenty years of service. [Ref. 4:p. 1]

C. THE MILITARY RETIREMENT FUND

To obtain better oversight for determining military retirement costs and force management policies, Congress through the Department of Defense Authorization Act of 1984, established the Military Retirement Fund (MRF) and an accrual accounting system for managing retirement pay. Before 1984, the military retirement system used a "pay as you go" basis, where current defense appropriation dollars paid for the current estimated retirement liabilities.

The MRF represents a trust fund that invests in special government securities. The Secretary of the Treasury administers the MRF. When securities go into the MRF, a Treasury security of equal value (same maturity date and coupon rate) is issued to the public. Then, at current market values, the MRF manager can exchange the security to match the requirements of retirement payouts.

Accrual accounting also introduced normal cost procedures to military retirement. Normal cost is the percentage of a worker's contributions during his or her employment that will allow for the cost of a lifetime of pension benefits. Normal cost is a type of

standardization that allows for two things: the comparison of pension plans and for the ensuing effects on cost when a modification of retirement takes place. By establishing the accrual accounting system, Congress took into account an unfunded liability of almost 530 billion dollars in 1984. This huge liability will be amortized over 60 years with payments to the MRF from the Treasury. [Ref. 5:p. 3]

The Military Retirement Fund receives its resources from three areas as shown in Figure 2.1 below: Military Personnel Appropriations via annual normal cost payments, payments for interest on the Fund's treasury securities, and payments to amortize the unfunded liabilities. The cash outflows or disbursements of the MRF go toward retirees. The estimated disbursements are based on calculations from the DoD Board of Actuaries, which was also established as a result of the Defense Authorization Act of 1984. [Ref. 6:p. 799]

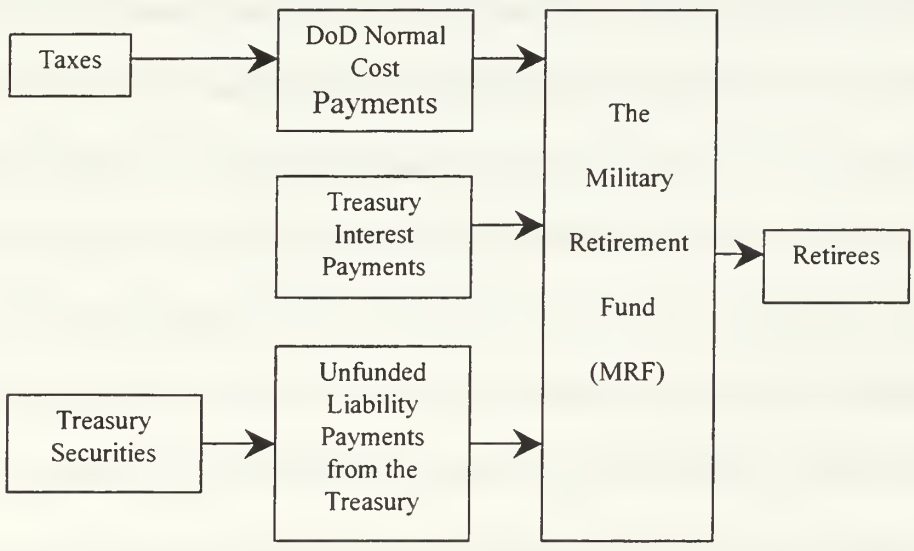


Figure 2.1. Military Retirement Fund Overview. Source: Adapted from The Valuation of the Military Retirement System, 1994.

D. CURRENT ISSUES

1. Force Management

Politicians and defense officials offer differing perspectives on military retirement. On the latter's behalf, it is important to recognize that the purpose of the military retirement system is, foremost, as a force management tool, closely tied to the five principles mentioned in the Valuation of Military Compensation. Primarily, promotion opportunities ensure a younger overall force and the incentive of the retirement system at a mid-career point that encourages military members to complete at least twenty years. Of secondary importance is the fact that military retirement provides a guaranteed lifelong pension after 20 YOS.

2. Congressional Legislation

Politicians who espouse legislation similar to REDUX, feel that the military retirement system leverages an inequality between defense personnel and their civilian counterparts. Specifically, this gap allows service members to retire from the military at an average age of 42, start a second career, and then fully retire at approximately age 62. This allows for two lifelong pensions, one beginning as early as age 38 (18 years old at the start of military service plus a 20 year career), and the other at the completion of the second career. Furthermore, military retirement costs have escalated, especially due to the aggregation of annual COLAs and the higher than average inflation in the 1970s. Thus legislation in the 1980s looked primarily at military retirement reform in order to

pare down the costs of retirement, make them more visible, and level military annuities in order to get them closer to comparable civilian retirement programs. [Ref 7:p. 2308]

The military retirement system represents a complexity of issues. Specifically, cost savings, fairness, and effectiveness form the core of the ongoing deliberations. The three legislative acts (DoD Authorization Act of 1981, Military Retirement Reform Act of 1986, National Defense Authorization Act of FY2000) of the last two decades characterize the type of changes upon the military retirement system. Politicians feel it is overly generous and continuously work to develop marginal reform approaches to reduce defense costs and create aspects of military retirement that are on a par with civilian retirement. Conversely, defense officials believe military retirement is appropriate, granted the inherent dangers and hardships of a military life. Admittedly however, the primary objective of military retirement from the defense standpoint is managing the force in reference to size and structure. The problem that presents itself is that these two opposing views have not meshed and any resulting system may require major structural reform vice the historical incremental changes.

E. THE FEDERAL EMPLOYEE RETIREMENT SYSTEM

1. Introduction

The Federal Employee Retirement System (FERS) was established in 1987 and is the modern version of the Civil Service Retirement System (CSRS). FERS applies to federal civilian employees who joined federal service after 1983 as well as those CSRS employees who transferred to the current system. CSRS was created in 1920 for federal

civilian employees, which was prior to Social Security's establishment by over a decade. During that time, those employees under the CSRS were not determined to be eligible for Social Security since they were already covered with their federal retirement. Further, the Social Security Amendments of 1983 accomplished two goals in reference to the FERS. First, it obligated all new federal employees to be covered by the Social Security Program. Its second goal was to reduce pension costs incurred by the government. To get an idea of the CSRS pension costs in FY1995, the system covered 1.4 million employees, and paid close to $38 billion dollars to approximately 2.3 million retirees and survivor annuitants. In contrast, FERS covered slightly less than 1.4 million employees in FY 1995, and paid $474 million dollars to approximately 48,000 retirees and survivor annuitants.

FERS is commonly viewed as a three-tier retirement system that consists of Social Security, a defined benefit pension, and an optional defined contribution plan, known as the Thrift Savings Plan. Each tier of FERS will be discussed below. [Ref. 8:p. 21]

a. Defined Benefit

A defined benefit program implies that the employer or organization will provide a future benefit or compensation after the employee retires. This future benefit is usually based on age at retirement and on a formula using time in service and final salary similar to military retirement. For example, the FERS formula based on 20 years of service and payable at age 62 is:

$$2\% \times 20\ YOS = 40\%$$

Cost of living adjustments are not usually provided until age 62 and the costs of the plan itself are the responsibility of the employer. [Ref. 9:p. 3] The average costs of a defined benefit plan are currently seven percent of employee pay. For a stand alone defined benefit plan, the risk of the program is on the employer. The employee has little or no leveraging power.

b. Defined Contribution

A defined contribution program represents a system where the employer and employee both provide funding towards retirement. Normally, the employer matches the employee's contributions but in some systems may match only a certain percentage. Other restrictions include the total amount of contributions that both employer and employee can make. These restrictions are based on tax laws. Attributes of defined contribution programs are flexibility in the types of plans, portability upon termination of employment, and tax deferrals. Under FERS, the defined contribution program is known as the Thrift Savings Plan. Here, an employee can contribute up to ten percent of basic pay, and the federal agency matches the first three percent dollar for dollar and then matches the following two percent at 50 cents to the dollar. After the five percent, additional employer matching is not allowed, but further employee contributions are considered pre-tax pay. In addition, earnings on all employee contributions grow tax deferred. [Ref. 10:p. 4] The amount of employee contributions is currently capped at $10,500 dollars. The TSP for FERS will be discussed in greater detail in the following chapter.

c. Social Security

Social Security provides the third portion of FERS. Social Security represents the largest government entitlement program. Both employers and employees are required by law to contribute to Social Security. Social Security benefits are based on taxable income and the number of working years. It is a non-means tested benefit that is payable at three different ages. Social Security is normally payable at age 65 for retirees born prior to 1950. The retiree also can choose to receive social security at age 62, but at a reduced percentage of the amount that is normally received at age 65. Current legislation has changed this eligibility age to 67 for retirees born after 1950 in related Social Security reform.

2. Purpose

The two federal civilian employee retirement systems' basic purpose is "to attract quality employees into federal jobs by offering a competitive total compensation package that provides for a secure retirement and takes into consideration an inherent responsibility to the nation's taxpayers." [Ref. 11:p. 21] Other objectives are to maintain comparability with the former CSRS through the use of the three-tiered benefit plan and to establish a retirement system that was modeled after those in the private sector. Specifically, a majority of the traditional defined benefit retirement programs were being phased out and replaced with more popular defined contribution programs in Figure 2.2 below. The defined contribution pension program places more responsibility on the employee. In reference to the Thrift Savings Plan, this sense of accountability for the pension's future cash flow comes in the form of deciding first to participate in the

program, second by determining how much to contribute, and lastly by choosing which type of security to invest in. The TSP for the FERS and the CSRS will be discussed in greater detail in later chapters.

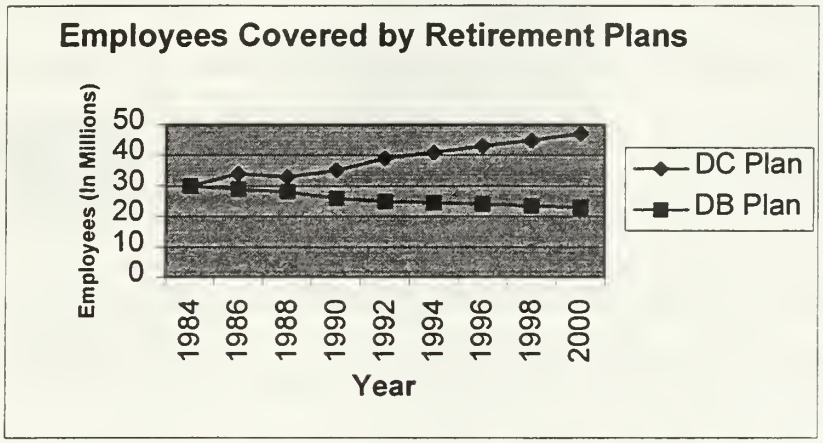


Figure 2.2. Popularity of Defined Contribution Plans versus Defined Benefit Plans. After: Blakely, Steven, US News and World Report, July 1997.

3. Eligibility

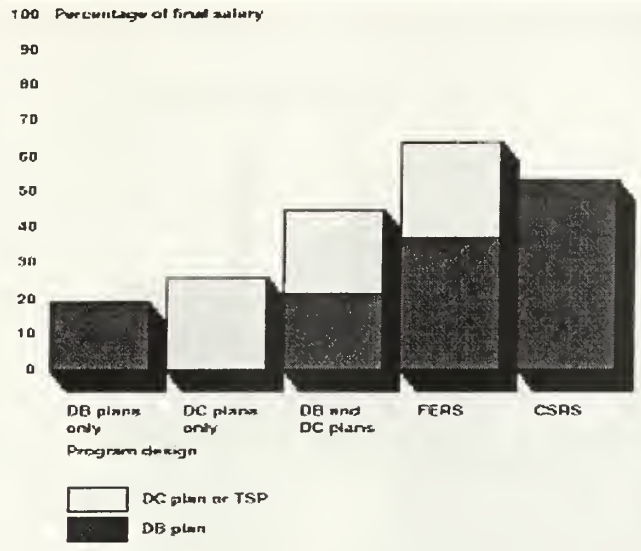
The FERS and CSRS maintain similar criteria in determining the monthly annuity, that is - age, length of service and the average of the highest three consecutive years of salary. Of the retirement systems in this thesis, CSRS represents the only single source retirement system, the defined benefit program and a program where federal employees do not receive pensions from Social Security. Accordingly, these employees have a mandatory seven percent of pay deducted from their salaries to fund their pension.

4. Replacement Rates

In a study carried out by the General Accounting Office in 1997, a comparison of federal and private sector retirement programs was conducted. Using the term

"replacement rate", which is the yearly stipend divided by the employee's salary in the final year on the job, a base of reference was established for comparing the different types of retirement programs. Other factors that were taken into consideration were the effects of inflation and defined contribution programs. For DC programs, the assumptions used in the study were full employer matching for the employees' maximum contributions, full employer matching for one-half of the employees' maximum contribution, and no employee contribution to the DC plan. Data for the private sector retirement systems are sourced from the Watson Wyatt Worldwide Database of 661 companies. [Ref. 12:p. 25] By using replacement rates for five programs – defined benefit only, defined contribution only, a combined defined benefit and defined contribution plan, FERS, and CSRS – a side by side comparison and analysis can be generated. The highest bar represents the greatest replacement rate. A breakdown of each aggregated bar denotes the type of plan, whether social security, defined contribution, or defined benefit. Also, three retirement scenarios are provided, given the following inputs: a final salary of $40,000 – those employees who retire at age 55 with 30 YOS, those who retire at age 62 with 20 YOS, and those who retire at age 65 with 20 YOS.

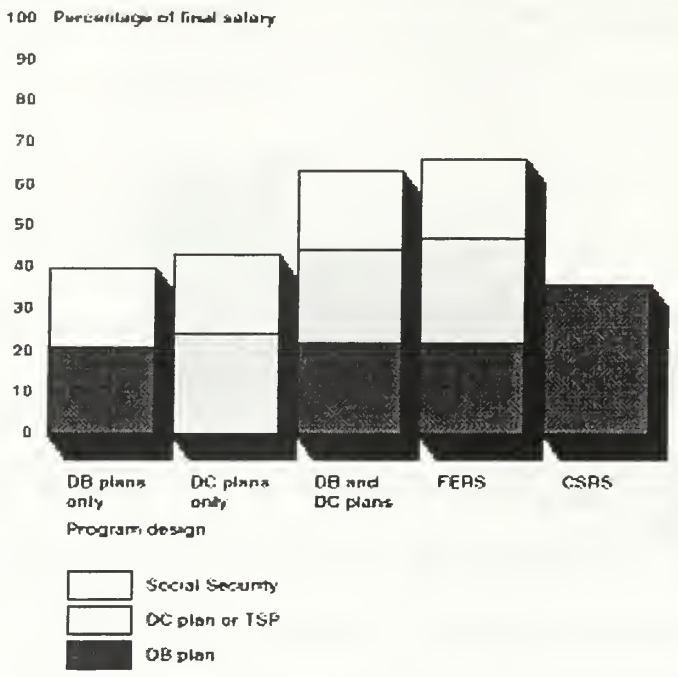
In summary, it is evident that in each of the three figures (Figures 2.3 – 2.5), clearly FERS maintains the highest replacement rates. Only in Figure 2.5, do the private sector programs that use a combined DB and DC program that come close to FERS (70.5 percent and 71.1 percent, respectively). [Ref. 13:p. 34]



Note 1: Social Security retirement benefits are not available at age 55. Retirees may elect to begin benefits at age 62.

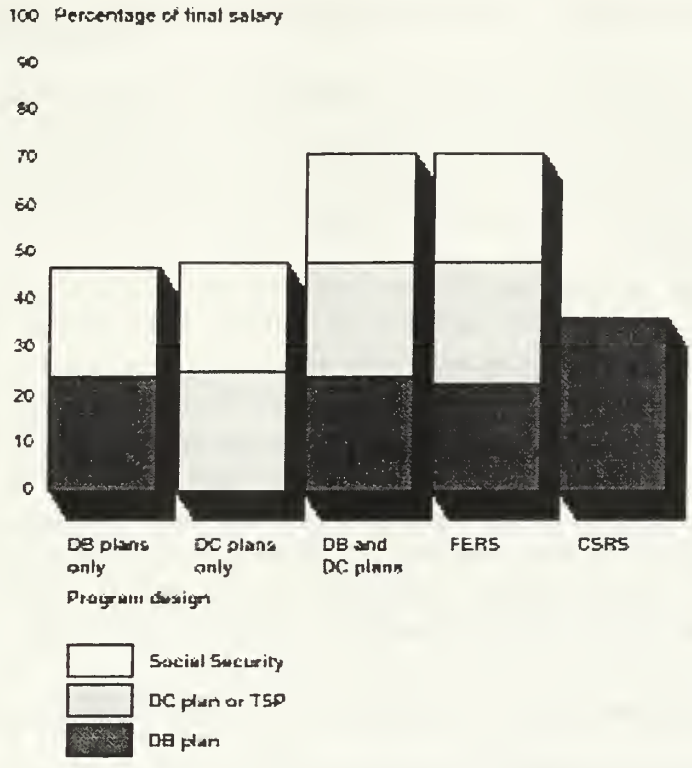
Note 2: The percentages shown were calculated using the assumption that the employee contributed the percentage of salary that is necessary to obtain the maximum employer-matching contributions.

Figure 2.3. Average Replacement Rates for Employees Who Retire at Age 55 with 30 YOS and a Final Salary of $40,000. Source: Watson Wyatt Worldwide database.



Note: The percentages shown were calculated using the assumption that the employee contributed the percentage of salary that is necessary to obtain the maximum employer-matching contributions.

Figure 2.4. Average Replacement Rates for Employees Who Retire at Age 62 with 20 YOS and a Final Salary of $40,000. Source: Watson Wyatt Worldwide Database.



Note: The percentages shown were calculated using the assumption that the employee contributed the percentage of salary that is necessary to obtain the maximum employer-matching contributions.

Figure 2.5. Average Replacement Rates for Employees Who Retire at Age 65 with 20 YOS and a Final Salary of $40,000. Source: Watson Wyatt Worldwide Database.

This GAO report illustrates several points on opposite ends of the spectrum. First of all, this study demonstrates the complexity and numerous factors that must be taken into account when trying to compare varying retirement systems. On the more optimistic side, the report developed a baseline of comparison, the replacement rate, which allowed the FERS, CSRS, and private sector companies to be rated together and evaluated.

F. SUMMARY

The goal of retirement systems, in general, is to provide compensation upon termination of employment. In general, there are three types of programs that facilitate retirement: defined benefit, defined contribution, and Social Security. The traditional Military Retirement System typifies the defined benefit program. This program guarantees a lifelong annuity after vesting a minimum of twenty years of service. A defined benefit program places the majority of risk upon the employer and the employee makes no monetary contributions toward retirement. A more current system, the Federal Employee Retirement System, is similar to commercial retirement systems and incorporates all three of the above programs to ensure its value and solvency. The FERS model spreads the risk almost equally between the employer and employee. In fact, its Thrift Savings Plan places greater responsibility for a sound retirement on the employee. In the following chapter, the principles of TSP will be discussed and a hypothesis will be developed for building a Thrift Savings Plan for military personnel.

III. THRIFT SAVINGS PLAN

A. INTRODUCTION

Despite an unheralded period of economic prosperity in the last decade in the United States, personal savings have actually decreased. According to data from the Bureau of Economic Analysis, the personal savings rate dropped from just over five percent in 1995 to a mind-boggling negative 0.2 percent in August 2000. To make this matter graver, if the government had not altered its method for calculating the personal savings rate in October 1999, this rate would be even lower. The personal savings rate in 1999, was boosted by three percent based on the government's revised formula. [Ref. 14:p. 39]

The Thrift Savings Plan or TSP represents an existing personal savings system that covers federal civilian employees. As described previously in Chapter II, the TSP characterizes the defined contribution elements of FERS and CSRS. In fact, the purpose of TSP is to establish a long-term savings and investment plan, with distributions from the TSP beginning upon the employee's retirement.

In this chapter, the TSP will be reviewed. While the focus is placed upon the plan's benefits and costs, other related variables such as choices of investment and loan privileges, which act as incentives that influence the employee's decision-making, will also be discussed.

B. ELIGIBILITY AND PARTICIPANTS

In March 2000, 2.5 million federal employees were enrolled in TSP. Of that total number, approximately 1.9 million or 76 percent of them make active contributions from their basic pay to the program. [Ref. 15:p. 1]

FERS employees make up the majority of participants and can contribute up to ten percent of their monthly basic pay with a maximum total annual contribution of $10,500 dollars. Of that ten percent, the first five percent is covered by government or agency matching. (CSRS employees can contribute five percent of their monthly basic pay, but are not authorized any agency matching.) There are two types of agency matching. The first is termed Agency Automatic Contributions. These one percent contributions are made to an employee's TSP account regardless of whether the individual actually participated in the plan. The second type of agency matching applies to actual contributors and affects the first five percent of basic pay in the following manner. The first three percent of contributions is matched dollar for dollar, while the following two percent is matched fifty cents (50 percent) to the employee's one dollar. All contributions are carried out via payroll deductions and are held in a trust for each participant. Agency contributions are not sourced from the employee's pay, are not taxable during the current year to the employee, and employee earnings grow tax-deferred. [Ref. 16:p. 2]

Vesting is defined as that amount of time it takes before an employee is eligible to participate in the TSP and receive defined contribution benefits. This condition applies

specifically to the Agency Automatic (1 %) Contributions. For FERS, vesting occurs when employees have at least three years of total Federal civilian service. If the employee leaves government service prior to three years, Agency Automatic Contributions are forfeited and retained by the TSP administration. [Ref. 17:p. 2]

C. ADMINISTRATION

The Federal Retirement Thrift Investment Board is the overall administrator of the TSP. As an independent government organization, the Federal Retirement Thrift Investment Board is composed of five members and manages the TSP on behalf of the participants and beneficiaries. In addition, the Board has a contract with the Department of Agriculture's National Finance Center (NFC) in New Orleans, Louisiana, which acts as a record keeping service for the TSP. The NFC maintains an archive of all records of TSP participants. Also at the NFC, the TSP Service Office administers all TSP withdrawals, loans or transfers. After an employee leaves government service, the TSP Service Office acts as the primary point of contact for TSP administration. [Ref. 18:p. 1]

D. FEATURES OF THE TSP

For all participants, the benefits of the TSP appear to outnumber the costs. The primary advantages of the TSP focus on flexibility, tax savings, and real-time updates of information due to advances in technology. Each advantage will be examined in order to gain an appreciation of the TSP system.

1. Flexibility

Once enrolled in the TSP, there are a total of five investment options. The first three have been available since the implementation of TSP: the Government Securities Investment or G Fund, the Fixed Income Index Investment or F Fund, and the Common Stock Index Investment or C Fund. The other two investment options, an international index fund (I Fund) and a U.S. small capitalization stock index (S Fund), are new options that will provide even more choices. While a TSP investor can choose a single fund that may match his or her risk tolerance, there are more options to either invest a percentage in two, three, or all of the investments. In this chapter, a review of the three primary funds (G, F, and C) will be examined in reference to risk and past performance.

a. Government Securities Investment or G Fund

The Federal Retirement Thrift Investment Board manages the G Fund. The G Fund is made up of short-term nonmarketable U.S. Treasury securities that are specifically designed for the TSP, and as such, are held in a trust in the U.S. Treasury. The G Fund's short-term securities have maturities that range from one to four days. More importantly, these securities by law earn interest equal to the average market rate of U.S. Treasury's marketable securities, which are those securities outstanding with four years (or greater) to maturity. The government guarantees these short-term securities, so there is virtually no risk or potential loss by investing in the G Fund. However, it is important to keep in mind that since risk is minimal, the historical rates of return are the lowest of all the TSP's investment options. While past rates of return are not an indicator of future performance, these historical trends give an idea of how the G Fund may

continue to perform. Table 3.1 below provides each of the last ten years of the G Fund and culminates with a ten year average annual rate of return:

Year	G Fund*	Related Securities**
1990	8.90%	8.97%
1991	8.15%	8.26%
1992	7.23%	7.32%
1993	6.14%	6.23%
1994	7.22%	7.29%
1995	7.03%	7.10%
1996	6.76%	6.80%
1997	6.77%	6.80%
1998	5.74%	5.77%
1999	5.99%	6.03%
1990 - 1999 average annual rate of return	6.99%	7.05%

*These returns are stated after deducting the administrative expenses of the TSP.

**Rates of return were calculated by the Board. These figures are based on the statutory rate of return and are stated without any reduction for administrative expenses.

Table 3.1. G Fund Rates of Return from 1990-1999. Source: WWW.TSP.GOV Website (September 2000)

b. Fixed Income Index Fund or F Fund

The second type of TSP investment option is the Fixed Income Index fund or F Fund. The Barclays Global Investors act as investment managers of the F Fund, via a contract they obtained from the Federal Retirement Thrift Investment Board. Consequently, F Fund contributions are invested in the Barclays U.S. Debt Index Fund, which represents a bond index fund that mirrors the Lehman Brothers U.S. Aggregate (LBA) index. Basically, the LBA index is made up of U.S. government, corporate, and mortgage-backed securities within the fixed-income securities market. An example of a fixed income security is a bond, long-term note, or "IOU" where a borrower agrees to

repay some amount to the bondholder (lender) at some later predetermined date or maturity. More specifically, these bonds pay semiannual interest until that maturity date.

The advantage of the F Fund is its overall diversification within both the public and private sector bond markets. Also, during periods of decreasing interest rates, the likelihood of higher rates of return exists with the F Fund's bonds when compared to the shorter-term securities in the G Fund. Over the long term, this phenomenon applies especially to bonds with longer maturity dates. Since its inception in January of 1988, the average maturity period of the F Fund bonds equaled almost nine years.

There are three types of risks associated with the F Fund: credit risk, market risk and prepayment risk. Credit risk, as it implies, is the potential failure of the issuer of the bond to pay interest or principle. This situation is most likely to occur with corporate bond issuers, but due to the diversification of the F Fund, individual "failures to pay" are unlikely to affect the Fund as a whole. The second type of risk, market risk, denotes that risk associated with the bond market and its related interest rate fluctuations over time. Once again, diversification with bonds with different maturity dates tends to minimize the impact of market risk within the F Fund. The last type of risk, prepayment risk, resides primarily with mortgage-backed securities and some corporate bonds. During periods of decreasing interest, homeowners have the option to refinance their mortgage loans at a lower interest rate. For mortgage-backed securities, refinancing via prepayments generally results in a decreased rate of return. The aggregate of credit risk, market risk and prepayment risk in the F Fund demonstrates that there is overall greater

risk when compared to the G Fund. However, there is also a greater likelihood for a higher rate of return as Table 3.2 below shows:

Year	F Fund*	LBA Bond**
1990	8.00%	8.96%
1991	15.75%	16.00%
1992	7.20%	7.40%
1993	9.52%	9.75%
1994	- 2.96%	- 2.92%
1995	18.31%	18.47%
1996	3.66%	3.63%
1997	9.60%	9.65%
1998	8.70%	8.69%
1999	-0.85%	-0.82%
1990 - 1999 average annual rate of return	7.51%	7.69%

* Through December 1990, the F Fund was invested in the Barclays Bond Index Fund, which tracked the Lehman Brothers U.S. Government/Corporate bond index. Returns are stated after deducting TSP administrative expenses and the F Fund management fees and trading costs.

** Calculated by Lehman Brothers. Returns are stated without deducting administrative and management costs.

Table 3.2. F Fund Rates of Return from 1990-1999. Source: WWW.TSP.GOV Website (September 2000)

With a 7.51 percent return from 1990 to 1999, the F Fund outpaces the G Fund (6.99 percent) by a little more than one half of a percentage point. Table 3.2 also demonstrates that there are also years where the F Fund posted negative rates of return (1994 and 1999, respectively). A contributor to this fund needs to keep in mind that some years may have extremely low or even negative rates of return. However, over the long term, the performance of the F Fund surpasses the G Fund.

c. Common Stock Index Fund or C Fund

Also managed by Barclays Global Investors, the C Fund is invested in the Barclays Equity Index Fund, which mirrors the Standard & Poor's 500 (S&P 500) stock index. The S&P 500 index was established in 1957 as a representative performance indicator of the stock market. Made up of four market sectors – industrials, utilities, transportation, and financial – and 106 different industries that are traded primarily on the New York Stock Exchange, the S&P 500 constitutes over 70 percent of the market value of stock markets in the U.S. (Market value equals current stock price times the number of shares outstanding.)

Similar to the F Fund, the advantages of the C Fund lie in its diversification. As an index fund, the C Fund follows economic trends. That is, during a period of economic prosperity, the C Fund has the potential for solid rates of return. Conversely, this also means that if a few companies during their business lifecycles have negative rates of return, it should have limited effects upon an index fund like the C Fund. Another advantage for contributors of the C Fund lies in its greater visibility of investments. The S&P 500 reflects some of the largest, and perhaps, the strongest companies in the U.S. Since this is the case, the S&P 500's daily performance is easily obtained or tracked via media such as television, radio, news articles, or the Internet. Lastly, the Barclays Equity Index objectively tracks the S&P 500 companies, which can be constantly added or replaced due to mergers, acquisitions, or bankruptcy. This keeps

the C Fund from becoming subjective, and therefore any favorable or unfavorable bias toward particular companies are removed.

There are some risks associated with the C Fund. Since the C Fund basically tracks the S&P 500, changes in the U.S. or global economy can affect the Fund's rate of return. Like the F Fund, some years may have negative performance and this translates to a loss of a percentage of the overall investment. Also, there is no active or timed trading where companies are bought or sold at attractive prices to the investors. Since the majority of contributions take place at the end of the month, the C Fund's rate of return generally reflects the stock market's performance during the latter half of the month. The rates of return for the last ten years are given in Table 3.3.

Year	C Fund*	S&P 500 Index**
1990	- 3.15%	- 3.10%
1991	30.77%	30.47%
1992	7.70%	7.62%
1993	10.13%	10.08%
1994	1.33%	1.32%
1995	37.41%	37.58%
1996	22.85%	22.96%
1997	33.17%	33.36%
1998	28.44%	28.58%
1999	20.95%	21.04%
1990 - 1999 average annual rate of return	18.18%	18.21%

* Returns are stated after deducting TSP administrative expenses and the C Fund management fees and trading costs.

** Standard & Poor's calculation of the performance of the S&P 500 index. Returns are stated without deducting administrative and management expenses and trading costs.

Table 3.3. C Fund Rates of Return from 1990-1999. Source: WWW.TSP.GOV Website (September 2000)

Like the F Fund, Table 3.3 shows that negative returns are possible, e.g. in 1990. The investor in the C Fund needs to remember that past performance is not a proven indicator of future rates of return. Also, the decade of the 1990s represents overall economic prosperity and growth for the majority of the S&P 500 companies. Of the three investment choices already described, the C Fund represents the highest rate of return at 18.2 percent for that period, almost tripling the F Fund and the G Fund. [Ref. 19:p. 2]

2. Tax Savings of the TSP

There are two main regulations that involve taxes and the TSP. The first type involves before tax savings. Before tax savings are those contributions that are made to the TSP but do not count against the contributor's federal and almost all states' taxable income. This results in a smaller amount of taxable income, and therefore fewer taxes to pay for the current tax year. Similar to before tax savings for the military is the Basic Allowance for Housing (BAH). While BAH is an allowance and not a contribution to a retirement plan, it is also not taxable and BAH acts as a stipend for off-base housing.

The second type of regulation involves tax deferrals. Tax deferrals are characterized by a postponement of taxes to a later date. That later date is normally after retirement when TSP withdrawals begin and the employee's tax bracket is lower. An even greater tax advantage is that earnings in the TSP family of funds grow tax-free until withdrawal. [Ref. 20:p. 1]

3. Withdrawals

Under normal retirement conditions (for retirees age 59 ½ or older), the TSP has three withdrawal options available. These choices are lump sum payment, lifetime annuity, and monthly payments. Each choice will be described briefly. A lump sum payment or cash out over time (20 years or more) can be significant and is subject to federal income taxes since it is viewed as ordinary income. The second option, lifetime annuity, is similar to life insurance, and equates to an amount of money or benefit which is payable each month to the TSP participant or his or her survivor. The TSP buys this annuity from an insurance company. The participant is given some built-in flexibility on types of available TSP annuities, each one having features to fit one's risk levels. The third choice to TSP participants is the monthly payment. Monthly payments can be either a fixed amount per month or an amount payable based on a fixed period of time. Lastly, funds withdrawn from the TSP can be transferred to an Individual Retirement Account (IRA) or other qualified retirement plans. These TSP transfers are called rollovers. [Ref. 21:p. 1]

Keeping in mind that the TSP is designed as a long-term savings vehicle, withdrawals while in-service, or while currently employed by the federal government, are limited. There are two options available while in-service. The first withdrawal option is restricted to those TSP participants with a documented financial hardship. The second withdrawal option applies to participants who are over the age of 59 ½, who can make a one-time in-service withdrawal. Both of the in-service withdrawal options are subject to

a mandatory 20 percent Federal income tax withholding, since the Internal Revenue Service (IRS) looks at in-service withdrawals as eligible rollover distributions. Therefore, the participant is required to pay taxes on the amount withheld. Further, early withdrawals are also subject to a ten percent tax penalty if the withdrawal is carried out before the year the participant reaches age 55. The bottom line, with in-service withdrawals and retirement withdrawals, is that they become subject to federal and state income taxes, and therefore these options should be well thought out prior to execution.

Once an in-service withdrawal takes place, it permanently reduces the overall amount in the TSP account, which is unlike the TSP loan option that will be described later in this chapter. Once again, it is important to review all options of the TSP prior to using this alternative. [Ref. 22:p. 1]

4. Real Time Updates

One of the premiere options available at the TSP website (www.tsp.gov) is the ability to review a participant's contributions to the savings plan. This is accomplished through an account number and a Personal Identification Number, more commonly known as a PIN number. Further, a participant can project his or her current balance in the TSP into an ending balance upon retirement. This projection is based on existing balances, the current percentage of contributions, expected rates of return, and other related factors. Table 3.4 provides a sample of growth projections for a FERS employee, given a $28,000 annual salary with no future salary increases, contributions of five

percent of basic pay per month, and estimated annual rates of return of four percent, seven percent, and ten percent.

Also, the TSP calculators can estimate annuity amounts, and assist in reaching retirement goals. Access to the website includes TSP forms and information that can be downloaded or printed. Also the website contains current rates of return (compounded monthly) for each respective TSP fund and the capability to carry out interfund transfers among the available funds. [Ref. 23:p. 1]

	Account Balance at Assumed Annual Rates of Return (Compounded Monthly)		
Account Balance After:	**4%**	**7%**	**10%**
5 Years	$15,400	$16,800	$18,200
10 Years	34,440	40,320	47,880
15 Years	57,400	74,200	96,880
20 Years	85,680	121,800	177,520
25 Years	120,120	189,280	310,240
30 Years	162,120	285,040	528,640
35 Years	213,360	420,840	887,880
40 Years	276,080	613,480	1,478,960

Table 3.4. Projected Account Balance of a FERS Employee Who Contributes 5% of $28,000 Annual Basic Pay. Source: WWW.TSP.GOV Website (September 2000)

5. TSP Loans

TSP contributions are accessible via loans, which represents a great feature to current federal employees, especially for large purchases like a down payment for a home or college tuition for children. Since the repayment of these loans are via automated

payroll allotments, only currently employed members can exercise this option. Loans are based on the participant's overall contributions to the TSP and there are two repayment periods available. The first repayment period of one to four years applies to general-purpose loans. The second repayment period of one to fifteen years is for major purchases such as a home. The interest rate that will apply for the duration of the loan is based on the G Fund's most current interest rate (six percent, as of October 2000).

The TSP Service Office administers and processes the loans. As with other types of loans, missing key information may delay the loan. Further, the TSP Service Office reserves the right to re-amortize or default the loan if either the monthly repayment amount does not match the original agreement or if the amount is late or off-schedule. This situation results in a taxable distribution, and is also subject to early withdrawal penalties of ten percent. [Ref. 24:p. 1]

E. EXPENSES OF THE TSP

Now that the features of the TSP have been examined, the costs or related expenses of the plan should also be taken into consideration. An overview of the primary current or maintenance expenses will be outlined, and will exclude the initial set-up costs that established the TSP in the 1980's. The major operating costs are broken into three categories: administration expenses, investment management fees, and trading expenses.

1. Operating Costs

Administration expenses make up the biggest percentage of operating costs. These costs are due to activities at the TSP Service Office, printing and mailing

publication, and most importantly, the maintenance and development of the record keeper's computer system. To pay for administration expenses, resources originate from two areas. The first source comes from those employees who leave the service prior to vesting. Described earlier, their automatic one percent contributions are forfeited and are then used to cover administration costs. The second source comes directly from participant and agency contributions. As earlier tables in the chapter show, the last two columns have a different percentage of rates of return. This difference represents the administration expenses. As an example, for 1998 the F Fund had an expense of .08 percent. This translates into every $1,000 dollars contributed being reduced by only eighty cents. Table 3.5 below lists the percentages to pay for TSP administration from 1988 to 1998 for the three major funds.

Year	G Fund	C Fund	F Fund
1988	.34%	.29%	.30%
1989	.21%	.20%	.23%
1990	.11%	.13%	.13%
1991	.13%	.15%	.16%
1992	.13%	.14%	.15%
1993	.12%	.13%	.14%
1994	.10%	.11%	.12%
1995	.09%	.10%	.11%
1996	.08%	.09%	.10%
1997	.07%	.07%	.08%
1998	.06%	.07%	.08%

Table 3.5. Administration Expenses from 1988 to 1998. Source: WWW.TSP.GOV Website (September 2000)

The G, C, and F Funds bear their proportionate share of net administration expenses. In contrast, the next type of expense is an investment management fee and applies only to the F and C Funds. As mentioned earlier in the chapter, both funds are managed by Barclays Global Investors via a contract from the Federal Retirement Thrift Investment Board. After net administration expenses have been allocated, Barclays' receives their investment management fee, which slightly reduces the overall rate of return for the F and C Funds. Lastly, trading costs also take place with the F and C Funds. The F Fund's U.S. Debt Index Fund tracks the LBA bond index and trading costs reflect these updates and changes. Similarly, the C Fund's Equity Index Fund follows the S&P 500 stock index. Trading costs incurred here are the result of public sector companies that are either added or dropped to the S&P 500, or mergers or acquisitions. Trading costs associated with the C Fund are extremely low, and some C Fund buys have no trading costs at all. Overall, both investment management fees and trading costs are minimal; in fact they are less than the percentages provided in Table 3.5 for administration expenses. [Ref. 25:p. 1]

F. SUMMARY

This chapter describes both the advantages and disadvantages of the TSP. The features are broken into three basic categories in reference to the contributor to the plan: flexibility, tax savings, and real time updates of information. As a more specific example, flexibility is expressed as all the available options within the savings plan. For instance, the G Fund's performance is illustrated through its annual rate of return as well

as its relative risk. Conversely, the costs of the TSP must also weigh into the potential contributor's decision-making. Here, the chapter describes the three types of operating expenses of the savings plan: administration expenses, investment management fees, and trading costs.

As can be inferred, an individual employee should see the potential payoffs for contributing to the TSP. These advantages outweigh the minor annual expenses, which are more closely tied to the costs associated with participating in the plan. In Chapter IV, the template of the TSP will be applied to the military personnel of the DoD, and a similar cost-benefit analysis will be carried out.

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IV. UNIFORMED SERVICES PAYROLL SAVINGS PLAN (USPSP)

> ...no matter what we do with the Social Security system, Americans should be saving more for their retirement. So we're working hard right now to make that easier, for example...401(k) plans, to take those plans with them when they move jobs, to have a system that would guarantee the security of that kind of retirement savings.
> [President Clinton's address regarding Social Security, March 21, 1998]

A. INTRODUCTION

While Chapter III presented the costs and benefits of the Thrift Savings Plan for federal civilian employees, this chapter will discuss an upcoming savings and retirement program designated specifically for military personnel. Further, President Clinton's administration has demonstrated that they are determined to introduce legislation to improve personal savings for retirement. This legislation specifically impacts military personnel, who have had their military retirement benefits seen as excessive, and whose retirement benefits were cut from fifty percent to forty percent of basic pay by the Military Retirement Reform Act (REDUX) of 1986. More recently, President Clinton asked that the DoD evaluate a 401(k) type retirement plan for the uniformed services (Army, Air Force, Navy, Marine Corps, and Coast Guard). Based upon the existing Federal Employee Retirement System's TSP, the military's version of the program is titled, the Uniformed Services Payroll Savings Plan or USPSP. [Ref. 26:p. 3]

B. BACKGROUND

In the National Defense Authorization Act for fiscal year 2000, Congress authorized the uniformed service personnel to participate in the existing TSP used by federal civilian employees. The term "member" was amended by the above Act to allow participation for both the uniformed services on active duty and the Ready Reserve. Consequently, this Act permits the 1.4 million active duty service members plus approximately 1.35 million Ready Reservists to voluntarily contribute to the USPSP. [Ref. 27:p. 5]

The military remains one of the largest organizations not yet covered by an employer sponsored, tax-advantaged savings plan. Therefore, one of the basic purposes of introducing the USPSP is to establish a long-term vehicle for personal savings. The USPSP will also augment the current military retirement system, basically a defined benefit program. Since contributions to the USPSP are strictly voluntary, the USPSP provides its participants with characteristics of a defined contribution plan. As a result, the USPSP gives its participants greater flexibility and this also translates into greater overall control of their financial future.

Accordingly, the rules and regulations for TSP participation that federal employees abide by, will also apply to military service members. More specifically, military service members can only contribute their own basic pay towards the program, with a maximum set at five percent of basic pay and a maximum dollar amount of $10,500 annually. Bonus pay and other special incentive pay such as Military

Occupation Specialty (MOS) bonuses or reenlistment bonuses may be also included as USPSP contributions. With respect to matching, the USPSP more closely parallels the CSRS, the Central Intelligence Agency, and Foreign Service, which have a defined contribution plan but exclude any employer matching.

C. ALTERNATIVES

From a service member's perspective, an analysis of other alternatives should be examined before contributing money to any long-term savings plan. Therefore, two other options, the traditional Individual Retirement Account (IRA) and the Roth IRA programs will be examined. These two programs represent other tax-advantage methods for saving for the long term or as an income supplement for retirement.

1. Traditional IRA

Congress authorized the traditional or regular IRA with the Employee Retirement Security Act of 1974. This Act provided tax-deferred retirement savings to the general public, specifically those workers without an employer sponsored pension plan. [Ref. 28:p. 31] Tax-deferred retirement savings represent one of the two main purposes of the traditional IRA. The second goal was intended to encourage people to save and overall, create incentives toward national savings. This plan itself allows a maximum of $2,000 dollars per year (or $4,000 dollars annually per married couple) that can be contributed to a bona fide program, such as an IRA sponsored mutual fund. The $2,000 dollars are tax-deductible for that tax year. Traditional IRAs can also be rollover IRAs, where money from one employee sponsored retirement plan can be transferred or consolidated into

another eligible retirement plan, without incurring any tax effects. [Ref. 29:p. 6] Since penalties apply to traditional IRA withdrawals before age 59 ½, it benefits a retired person who will likely be in a lower tax bracket, where any IRA distributions would result in less taxes to the IRS. Therefore, traditional IRAs can be both "front-loaded", where annual IRA contributions are tax deductible, and also "back-loaded", in that they provide tax-deferred savings at a normal retirement age.

2. Roth IRA

The Roth IRA is a relative new type of IRA. While Roth IRA contributions are not tax-deductible and therefore "front-loaded", these contributions become tax exempt or grow tax free upon withdrawal. In other words, all contributions and related earnings will never be federally taxed as long as withdrawals take place after age 59 ½. There are several other requirements for contributions to become tax exempt, but the primary requirement is that the contributions must remain in the Roth IRA sponsored program for a minimum of five years to avoid any penalties for early withdrawals. Roth IRA tax-free distributions are then allowed for first home purchases, disability, or costs related to college education. Contributions per year are almost the same as traditional IRAs ($2000 dollars per individual and $4000 dollars per married couple, respectively), and the remaining exception for eligibility is that single tax payers have an Adjusted Gross Income not greater than $95,000 dollars and, similarly, $150,000 dollars for couples.

While both the traditional IRA and Roth IRA are appealing and maintain their advantages based on individual circumstances, studies show that only 6 percent of

eligible taxpayers, who represent the majority of military service members, actually make IRA contributions. [Ref. 30:p. 6] Despite the small percentage that makes IRA contributions, it is still a prudent consideration when making a long-term investment.

D. THE PROPOSED UNIFORMED SERVICES PAYROLL SAVINGS PLAN

1. Introduction

The USPSP represents a huge commitment from the U.S. taxpayers and politicians to support their military personnel. This public support came about despite three decades of U.S. budget deficits. When the Budget Enforcement Act of 1990 was established, "pay as you go" or PAYGO procedures were applied toward mandatory spending programs. PAYGO states that any new additional programs must have matching offsets in funding, such as from reductions to other mandatory spending government programs. In this regard, the DoD's only mandatory spending program that could support the proposed USPSP is its military retirement system, which serves to spark controversy amongst the three major services. In addition, since the USPSP contributions from service members are tax-deferred, the government receives less revenues each tax year beginning in the year that the USPSP is implemented. However, language in the National Defense Authorization Act for fiscal year 2001 (H.R 4205) states "...the recommended provision would also eliminate the requirement for the President to identify mandatory spending offsets that are currently provided in the Concurrent Resolution on the Budget for fiscal year 2001." [Ref. 31:p. 5] Later in this

chapter, the Congressional Budget Office (CBO) review of the PAYGO issue in regard to this lost tax revenue will be examined.

Similar to the FERS employees' TSP from Chapter 3, a discussion of significant advantages and disadvantages of the USPSP will be presented next. Most of the immediate advantages pertain to the service member, while the long-term advantages pertain to the DoD as a whole. Similarly, the costs or expenses of the program will be discussed in reference to the data compiled from DoD and CBO.

2. Service Member Advantages

Excluding the primary purpose of establishing the USPSP (i.e. a long-term savings plan, which has been discussed in Chapter III), the other major features that appeal to service members are immediate vesting, portability of the plan, and built-in flexibility. These factors apply to both enlisted and officer personnel and are considerations that each individual should take into account when, and if, they decide to make the military a career (i.e. carry out twenty years of service to qualify for military retirement).

a. Immediate Vesting

The definition of immediate vesting to service members means that upon the implementation of the USPSP, those personnel on active duty and those in a Ready Reserve status become instantly entitled to this type of defined contribution retirement benefits. Under most private sector retirement plans, vesting occurs after a certain number of years of employment (e.g., five years). Basically, vesting means that the

benefits are yours to keep if circumstances dictate that you need to change jobs or if you decide to leave for your own reasons.

b. Portability

Portability of the USPSP allows the service member who decides to leave the service, to receive his or her contributions and its related earnings in a lump sum or via installments. At this point, these distributions become taxable income, and are subject to federal taxes and any applicable state and local taxes. Early withdrawals prior to age 59 ½ are also subject to penalties. Portability can also be considered as an IRA rollover, where distributions are transferred from one IRA sponsored plan to another tax qualified plan (e.g. 403 (b) plan for non-profit organizations, or other employee sponsored plan). Another option permits the service member to maintain his or her account with the USPSP, where contributions would cease but earnings would continue to grow tax-free.

c. Flexibility

As mentioned in Chapter III, the service member receives numerous options by participating in the USPSP. Through its interactive website, www.tsp.gov, service members will enjoy the same primary features that have been available to federal employees, that is, selecting from different funds to invest in, reviewing contributions and actual tax-deferred earnings, changing allocations among funds, using USPSP contributions as loans, and projecting future growth of contributions. Lastly, the ability to use payroll deductions translates into a simple convenience, and avoids the complexity of other allotments of civilian financial institutions (e.g., mutual fund companies)

3. Long Term Benefits to the Department of Defense

The benefits of the USPSP also apply to the uniformed services as a whole. Since the existing language in the National Defense Authorization Act for fiscal year 2001 did not change and the USPSP is not subject to PAYGO, then the DoD's implementation of the USPSP potentially should have favorable results in three significant areas. The USPSP is expected to factor positively upon its recruiting efforts, retention, and military retirement.

a. Recruiting

Since initiating the All Volunteer Force in 1974, recruiting for all the uniformed services has been an on-going effort to meet pre-established annual quotas. Further, with the end of the Cold War and the demise of the Soviet Union coupled with the booming economy in the U.S., recruiters in all the services are having difficulty in finding quality applicants. With the implementation of USPSP, recruiters can provide an additional incentive that should factor positively on an applicant's decision to enlist or become a commissioned officer. Additionally, the USPSP levels the playing field so the DoD can compete on a more equal basis with the private sector.

b. Retention

One of the strongest affirmative indicators that the DoD's is actively concerned about its personnel is demonstrated through the adoption of the USPSP. While the Army and the Air Force have concerns about a USPSP because it may reduce current military retirement, the Navy and Marine Corps actively endorse the savings plan despite the possibility of legislative offsets. [Ref. 32:p. 1] According to a preliminary study

carried out by the DoD Directorate of Compensation, the patterns of retention are estimated to improve "slightly," if an employer sponsored, tax-deferred, voluntary, long-term saving plan is initiated. For example, the USPSP could significantly influence a decision by those mid-career (those already who have completed 10-12 years of service) service members to remain in the military.

c. Retirement

The majority of military personnel never reaches twenty years of service and do not receive the benefits of the military retirement system. In fact, this majority represents 83 percent of the uniformed services. As mentioned earlier, the establishment of the USPSP allows service members to augment the benefits provided upon reaching 20 years of service. [Ref. 33:p. 3] Therefore, the USPSP acts as an additional incentive to its members to either make contributions so that if they do decide to leave the service, they do receive something in the form of separation pay. Also for those personnel who do make the military a career, they will have additional income that will augment the benefits of military retirement.

E. DISADVANTAGES OF THE USPSP

1. Costs of USPSP

Immediate or short term expenses include start up costs, such as the likelihood of payroll administration expansion within the Defense Finance and Accounting Service (DFAS), educational materials, and other related administrative costs. Additional information technology issues such as software or mainframe integration of DFAS and federal workers' TSP may also arise. Yet the federal employee's existing costs when

compared with the private sector are minimal. For example, when comparing the TSP's "C" Fund administration cost of .09 percent versus a mutual fund industry average of .99 percent, the cost of TSP's fund amounts to only one-tenth that of the average mutual fund. It is not yet known if this small percentage is likely to change with the USPSP.

Furthermore, the costs of establishing a long-term savings plan specifically for the uniformed services vary with the institution carrying out the analysis. The two institutions that have conducted a cost estimation of a military savings plan are the Congressional Budget Office (CBO) and the DoD Directorate of Compensation. Cost estimates vary depending on personnel participation rates, projected growth rates, and other related factors.

2. CBO Cost Estimate of H.R. 4205

Cost estimates provide the following:

> Under the Congressional Budget Act, CBO is required to develop a cost estimate for virtually every bill reported by Congressional committees to show how it would affect spending or revenues over the next five years or more. For most tax legislation, CBO uses estimates provided by the Joint Committee on Taxation, a separate Congressional analytical group that works closely with the two tax-writing committees. [Ref. 34:p. 1]

CBO's cost estimate of Floyd Spence's National Defense Authorization Act for fiscal year 2001 (H.R. 4205) is based primarily on two areas: the effect upon tax revenues and the effect on direct spending (outlays) as they apply to the budget year plus the following four years. For tax revenues, CBO has calculated the following:

> Based on information provided by the Federal Retirement Thrift Board, the estimate assumes implementation of the Thrift Savings Plan in fiscal year 2002. The Joint Committee on Taxation estimates that the revenue loss caused by deferred income tax payments would total $47 million starting in 2002 and $1.1 billion over the 2002-2010 period. [Ref. 35:p. 1]

Similarly, CBO has determined the overall effects of H.R. 4205 on direct spending: "CBO estimates that enacting H.R. 4205 would increase direct spending by $11 million in 2001, $20 billion over the 2001-2005 period, and $62 billion over the 2001-2010 period." [Ref. 36:p. 2] A year-by-year effect on tax revenue (government receipts) and direct spending is given in Table 4.1.

Accordingly, a similar 1999 CBO cost estimate for the participation of service members in the federal TSP was made within the National Defense Authorization Act for fiscal year 2000 (S. 1059). CBO concluded that there would be a total of 980 million dollars of lost tax revenue for the implementation of the USPSP, which covered the years 2000-2009. [Ref. 37:p. 13] Both CBO estimates include the following input factors:

> Section 661 would allow members of the uniformed services on active duty and members of the Ready Reserve in any pay status to participate in the Thrift Savings Plan. Contributions would be capped at 5 percent of basic pay. In addition, service members would be able to contribute income they receive in the form of special or incentive pay to the extent allowable under the Internal Revenue Code. [Ref. 38, p. 9]

However, this lost tax revenue merely represents the value of the revenue deferred for that particular tax year. It really isn't "lost," meaning that it will never be replaced or made up. In fact, with tax-deferred savings on contributions and earnings on those

contributions, the government or IRS will eventually receive its income tax revenues plus all the compounded earnings at a future date. That future date is determined when the USPSP participant begins making withdrawals and distributions from the account are made.

	By Fiscal Year, in Millions of Dollars									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CHANGES IN DIRECT SPENDING (OUTLAYS)										
New Health Care Trust Fund	23	150	5,703	6,183	6,679	7,159	7,662	8,182	8,753	9,383
Energy Employees Compensation										
DOE Workers' Benefits	0	152	262	218	162	141	84	89	78	85
Uranium Workers' Benefits	0	102	135	82	52	41	81	40	40	32
Medicare Payments	0	-11	-16	-21	-25	-26	-29	-31	-34	-35
Disability Retirees	0	25	25	25	25	25	25	25	25	25
MGIB Enrollment	-20	-30	6	31	44	38	35	27	14	5
Lease Payments	1	2	4	5	6	6	6	6	7	7
Retirement of Reserve Technicians	-2	-3	-5	-5	-5	-4	-4	-3	-2	-1
Property Transactions	3	3	3	3	3	3	3	3	3	3
Entitlement to Separation Pay	0	0	0	1	2	3	4	5	6	7
Supplemental Allowance	-2	-5	-5	-5	-5	-4	0	0	0	0
Utility Reimbursements	a	1	1	1	1	1	1	1	1	1
Funding for WWII Memorial	3	3	0	0	0	0	0	0	0	0
VSI/Early Retirement	4	8	a	-1	-1	-1	-1	-1	-1	-1
Federal Judges	1	a	a	a	a	a	a	a	a	a
Subtotal	11	397	6,113	6,517	6,938	7,382	7,827	8,343	8,890	9,511
NONROUTINE ASSET SALES [b] (OUTLAYS)										
National Defense Stockpile	-30	-80	-20	0	0	0	0	0	0	0
Titanium Sales	-3	-4	-4	-5	-5	-5	-5	-4	-4	-4
Subtotal	-33	-84	-24	-5	-5	-5	-5	-4	-4	-4
CHANGES IN REVENUES										
Thrift Savings Plan	**0**	**-47**	**-76**	**-99**	**-120**	**-132**	**-142**	**-151**	**-159**	**-168**
TOTAL CHANGES [c]										
Net Increase or Decrease (-) in the Surplus	22	-360	-6,165	-6,611	-7,053	-7,509	-7,964	-8,490	-9,045	-9,675

NOTE: MGIB = Montgomery GI Bill
VSI = Voluntary Separation Incentives

Source: CBO Cost Estimate of H.R. 4205

Table 4.1. Budgetary Impact of H.R. 4205 on Outlays and Revenues.

3. DoD Directorate of Compensation Cost Estimate

Based upon a fiscal year 1999 force structure that includes all pay grades and the Reserves, the DoD Directorate of Compensation calculations differ dramatically. For the years 2001 to 2009, the Directorate's estimates loss of revenue equal 483 million dollars as opposed to the CBO's estimate of S. 1059 which equaled 980 million dollars. Most of the Directorate's estimation factors are modeled on the CSRS participation and contribution rates.

Calculations for the Directorate's cost estimate of lost revenue due to the USPSP begin with the 1999 force structure that includes the Army, Navy, Air Force, Marines, Coast Guard and Reserves. Some assumptions used in this projection include a 4.4 percent annual growth adjustment for pay increases and a stable force structure, using the 1999 force throughout the projection. For an example of the calculation of basic pay, the total number of service members in the E-3 pay grade with two years of service is summed, and this number is multiplied by the corresponding amount of annual basic pay:

(180,582 E-3's with 2 YOS) x ($1,261 monthly pay x 12 months)

This basic pay number is then multiplied by a constant contribution rate of three percent. Since all contributions are voluntary, contributions range from zero percent (no contribution) to five percent (maximum allowable percentage of contribution). This three percent represents the average amount of available contributions and is applied to all pay grades. Next, the contribution number is multiplied by the amount of participation in the first year, projected at 12.5 percent for the year 2001, and expected to grow at three

percent up to the year 2006 (e.g., 2001 – 12.5%, 2002 – 15.5%, 2003 – 17.5%, 2004 – 19.5%, 2005 – 22.5%, 2006 – 25.5%, 2007 – 27.5%, 2008 – 31.0%, 2009 – 32.5%).

The formula for basic pay for the first year, 2001, is summarized below:

(Total number of members) x (Basic pay) x (3 % Contributions) x (12.5% Participation)

Appendix A provides the DoD Directorate's cost estimate. Each annual projection is summed for each rank and then totaled for each year - beginning in the year 2001 and carried out to the year 2009. The same formula is also applied to warrant officers and commissioned officers of each respective service.

For bonuses, a similar approach is used to determine the amount of contributions to the USPSP. Annual contributions allow bonus type pay, but cannot exceed the $10,500 dollar limit established by law. For bonus type pay, instead of using an income breakdown by pay grade, the Directorate uses a sum of all applicable bonuses, incentive pay, or special pay. This sum is determined and a percentage of it is multiplied by the same three percent contribution rate and same participation rate used in the basic pay formula. Appendix A provides the calculations for bonuses. To review, the Directorate's input factors for lost tax revenue are shown in Table 4.2.

The Directorate uses the CSRS model, where the average federal employee is significantly older on average (age 46), while the average age for the service member is only 22. [Ref. 39:p. 1] Using this broad assumption for contribution rates and annual participation rates is for the cost estimate only and may not hold true to the actual rates.

Factor	Percentage	Comments
Participation Rate	12.5% for 2001	3.0% annual increases, up to 32.5% in 2009
Contribution of Basic Pay	3.0%	Flat rate applied to all pay grades
Contribution of Bonuses	3.0%	Applied to sum of bonuses
Force structure	NA	Held constant for 2000-2009
Pay table	4.4%	Annual growth adjustment

Table 4.2. Input Factors for DoD Directorate of Compensation's Cost Estimate from 2001 to 2009. Source: Dr. S. Pleeter, DoD Directorate of Compensation (September 2000)

The Directorate's total projection of $483 million dollars from 2001 to 2009 is given below in Table 4.3:

	Basic Pay	Bonuses	Coast Guard	Reserves	Total
Year 1	21,452,662	596,880	560,191	818,001	23,427,733
Year 2	27,771,758	737,685	725,200	1,280,989	30,515,633
Year 3	36,475,964	917,406	952,492	1,783,137	40,129,000
Year 4	43,277,668	1,077,669	1,147,387	2,326,994	47,829,718
Year 5	50,436,112	1,215,450	1,357,588	2,915,258	55,924,408
Year 6	58,533,751	1,351,719	1,528,484	3,550,785	64,964,740
Year 7	62,790,752	1,468,530	1,639,647	4,058,040	69,956,968
Year 8	65,983,502	1,559,376	1,723,019	4,463,844	73,729,740
Year 9	69,176,252	1,650,222	1,806,391	4,869,648	77,502,512
Total	**435,898,420**	**10,574,937**	**11,440,399**	**26,066,696**	**483,980,452**

Table 4.3. DoD Directorate of Compensation Calculation of Lost Tax Revenue ($ In Millions). Source: Dr. S. Pleeter, DoD Directorate of Compensation (September 2000)

F. SUMMARY

The USPSP represents a distinct advantage to the uniformed service member, especially since it does not appear to adversely affect military retirement in its current

form. Within H.R. 4205, the National Defense Authorization Act of fiscal year 2001, the federal worker's TSP becomes available to military service personnel and Ready Reservists, totaling almost 2.8 million members.

The USPSP represents a defined contribution plan, where participants can provide up to five percent of basic pay, includes bonus type pay, and cannot exceed $10,500 dollars per year. The USPSP works in a similar fashion to a private sector employer sponsored pension plan or 401(k), where contributions are not taxed for that year and earnings grow tax-free until withdrawals are made.

While the service member should gain more financial control of his or her future, the individual services also are bolstered up a notch in recruiting, retention, and retirement. In other words, the USPSP makes the services not only more attractive as a career path, but also more competitive with jobs in the civilian market.

In relation to costs with the USPSP, the estimation of lost tax revenue differs widely with CBO's and the DoD's projections. This appears to be largely due to the assumptions made within each organization. Chapter V will focus more closely on the input variables in the Directorate's estimate, and try to determine a better forecasting method using Monte Carlo simulation.

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V. DATA ANALYSES

> Monte Carlo analysis uses the process of simulation to achieve a range of solutions to a problem. [Ref. 40:p. 91]
>
> In a simulation, we are interested in moving the model through time to see the dynamic behavior of the system. [Ref. 41:p. 8]

A. INTRODUCTION

In Chapter IV, data were collected from the DoD Directorate of Compensation in order to determine the costs of implementing the military's version of a 401(k) plan, the Uniformed Services Payroll Savings Plan or USPSP. In particular, these costs were in the form of lost tax revenue, where the government would receive less annual tax dollars due to the pre-tax contribution dollars that each participant gave to the savings plan.

A total of three estimates were carried out. The initial estimate was completed by the Directorate, which forecast lost tax revenue of a total of 483 million dollars from the years 2000 to 2009. [Ref. 42:p. 1] The Congressional Budget Office did the second estimate, and they also carried out two estimates. Their first estimate pertains to the National Defense Authorization Act for fiscal year 2000 (S. 1059), which calculated 980 million dollars of lost tax revenue. This 980 million dollars was contingent upon the USPSP's implementation in the year 2000 and was extended to 2009. CBO's second estimate applies to the National Defense Authorization Act for fiscal year 2001 (H.R. 4205) and basically updates their first estimate to equal 1.1 billion dollars. This dollar amount is based on the year 2001 to 2010 time frame. For comparing the same time

frames, that is, the years 2000-2009, the CBO's cost estimate for the National Defense Authorization Act for fiscal year 2000 (S. 1059) most closely corresponds to the DoD Directorate's estimate.

Notwithstanding, the Directorate's estimate and CBO's estimate vary considerable despite basing their assumptions on the same CSRS model. While the CBO assumes higher figures in regard to the average contribution percentage and participation percentage, CBO also considers an estimated "internal earnings" that are the result of the investments (i.e. C, F, or G Fund). [Ref. 43] These internal earnings grow considerably since there are no annual payouts, and any earnings remain within the savings plan. Taking into account the time value of money, which demonstrates that over longer periods of time, earnings made from regular contributions are compounded and inevitably can add substantially to the overall investment.

The purpose of this chapter is to analyze the cost of the USPSP using the Directorate's assumptions. This data analysis will use Monte Carlo simulation in order to obtain a better range of probable outcomes. This type of modeling approach is beneficial and advantageous for a variety of reasons. For example, simulation is carried out in controlled settings, that is, the individual carrying out the analysis determines which variable(s) he or she wishes to include in the experiment. With the advent of computers and spreadsheets, simulation modeling also can be carried out quickly and without developing external costs.

B. BACKGROUND

Today, Monte Carlo simulation is used in finance, accounting, marketing, and risk analysis. It gets its name from the city in Monaco made famous for gambling and its games of chance. Monte Carlo simulation was also used in the Manhattan Project and the development of the atom bomb during World War II. Monte Carlo simulation uses a random number generator built into modern computer spreadsheets. The spreadsheet that will be used for this data analysis is Microsoft's Excel Spreadsheet with an add-in program called Crystal Ball. The following can summarize the basic procedure:

> The essence of Monte Carlo Simulation is the selection of a sample of possible outcomes for all the uncertain variables or events of the problem. With values for each of these variables specified, the variable representing the study objective can be calculated. This constitutes one simulation run, and since this is only one of many possible sets of outcomes to which the system or process is subjected, many such runs must be made. Therefore, the basic ingredients of the Monte Carlo method are a random variable, its probability distribution function, and a sequence of random numbers. [Ref. 44:p. 8]

The results of a Monte Carlo simulation show a probability or a likelihood of reaching a pre-determined objective. Therefore, Monte Carlo simulation represents a probabilistic model vice a deterministic model, which assumes that all input factors are known for sure. For example, Monte Carlo simulation shows that there is a 20 percent probability that there will be a 483 million dollar loss of tax revenue for the time period of 2000-2009 (probabilistic), which is much more informative than just using a constant 483 million dollar figure over the same period (deterministic).

C. MODEL METHODOLOGY

The Directorate's cost data will be examined to demonstrate the value of using Monte Carlo simulation. The spreadsheet model's methodology consists of four steps:

- Define (the) Assumptions to all the input variables, that is, determine the type of probabilistic distributions that should applied to the input variable
- Apply the formulae necessary to link spreadsheet cell to spreadsheet cell
- Define (the) Forecast, in other words, assign the spreadsheet cell which contains the ending value that is the outcome of your simulations
- Run the simulation and create appropriate reports

Next, the above four steps are repeated upon each section that contributes to deferred tax revenue (DoD basic pay, Coast Guard basic pay, Bonus pay, and Ready Reserves pay). The basic pay data for the Coast Guard will be studied first since it is a mini-system of the DoD, and has a similar pay grade system (i.e. enlisted, warrant officers, and commissioned officers). Further, once the Coast Guard's probabilistic model for estimating lost tax revenue is completed, an extension of this procedure can be applied to the rest of the DoD and the Ready Reserves.

1. Define Assumption

Once the appropriate variables for the probabilistic Coast Guard model are determined, the next step is developing the range of uncertainty of the input variables, that is, applying the appropriate probabilistic distribution curve. Crystal Ball creates this by using the Define Assumption function. The Define Assumption applies to three input variables for the Coast Guard model – the projected participation rate, the projected

contribution rate, and the projected growth rate. By applying a three level estimate similar to PERT (Program Evaluation and Review Technique), a probabilistic distribution of the worst case, best case, and most likely case can be generated. [Ref. 45: p. 568] For this analysis, a triangular distribution of the three possible conditions is used.

The projected participation rate from the Directorate is based on assumptions made from the CSRS participation rate, which begins at 12.5 percent and increases at approximately three percent per year. For the simulation for the first year, the probabilistic values ranged from 9.5 percent (worst case) to 15.5 percent (best case), and the most likely value remained at 12.5 percent. For the year 2001, Figure 5.1 gives the probabilistic distribution curve for the estimated participation rate, the first input variable. Similarly, the remaining two input variables have corresponding probabilistic distribution curves that must be defined within the Define Assumption function.

Triangular Distribution Parameters:

Minimum	9.5%
Most Likely	12.5%
Maximum	15.5%

Figure 5.1. Triangle Distribution Curve for Participation Rates in 2001.

Similarly, the estimated contribution rate using a probabilistic approach ranged from one percent (worst case) to five percent (best case), and the most likely case equaled three percent. The triangular distribution for the year 2001 is provided in Figure 5.2 below.

Triangular Distribution Parameters

Minimum	1%
Most Likely	3%
Maximum	5%

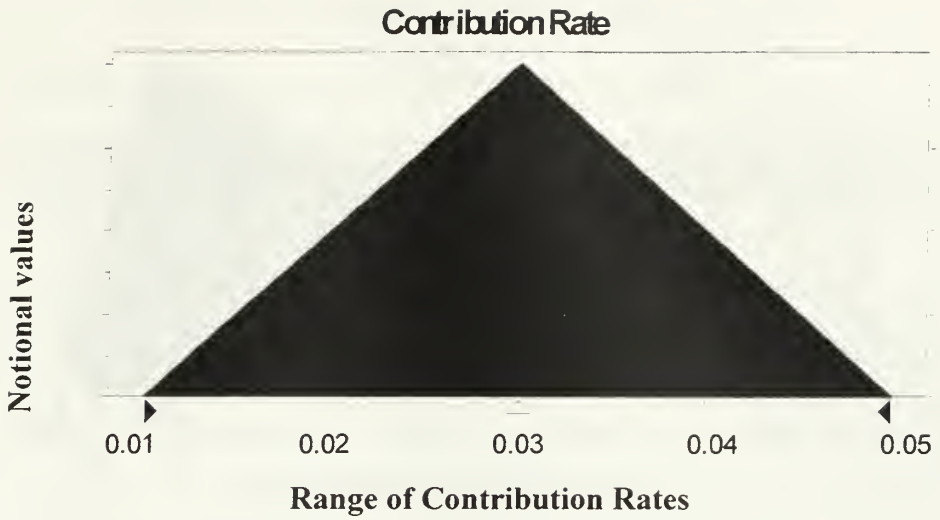


Figure 5.2. Triangle Distribution Curve for Contribution Rates in 2001.

The last probabilistic distribution curve takes into account the annual growth rate of the military pay table after the year 2001. The growth rate is used to offset the effects of inflation, or the decreasing buying power value of basic pay. With growth rates in the last 15 years that have varied from as little as two percent to as high as 4.8 percent, a triangular distribution was developed in Figure 5.3 below.

Triangular Distribution Parameters

Minimum	2%
Most Likely	4.4%
Maximum	4.8%

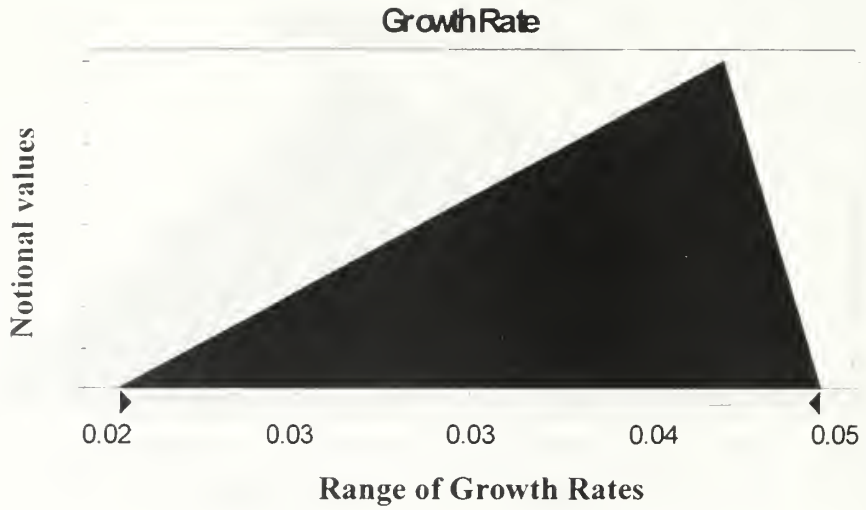


Figure 5.3. Triangle Distribution Curve for Growth Rates in 2001.

The growth rate distribution curve shows that one of many possible growth rates should fall within the range of "likelihood". The growth rate is the last probabilistic variable that the analyst must assign.

2. Formulae

Once the three input assumptions are defined, formulas are developed to link spreadsheet cell to spreadsheet cell. To cite a previous example, to determine Total Annual Income per rank, the following formula is used:

(Total Number of E-3's with 2 YOS) x (Annual Income) =

(Total Annual Income for E-3's with 2 YOS)

The next step is to determine the probable number of participants and their corresponding contributions. Finally, this result is multiplied by a standard 16 percent tax rate for all

participants to obtain the lost tax revenue. Tables 5.1 below illustrates the input variables and their range of values and is part of the formulae discussed.

Rate	Initial Value	Annual Change	Range
Participation Rate	0.125	0.03	.095-.155
Contribution Rate	0.03	0.02	.01-.05
Growth Rate	0	0.044	Applies after 2001
Tax Rate	0.16		

Table 5.1. Input Variables for the Coast Guard's Basic Pay in 2001.

3. Define Forecast

The Define Forecast function completes the set up of the simulation by assigning a spreadsheet cell with the formula that contains the ending value or forecasted value. This ending value changes throughout the simulation, as each of the 2000 trials produces a different ending value and in this manner, a new distribution curve is created. Lastly, Table 5.2 summarizes these calculations for the Coast Guard for the year 2001.

4. Running Simulations

After setting up and running the Monte Carlo simulations for the Coast Guard's basic pay in 2001, each successive year up to 2009 carries out the simulations. A corresponding procedure is carried out for the DoD's basic pay, bonus pay, and Ready Reserves pay for the years 2001 to 2009. The sum of the above four sections constitute the total tax revenue lost to the federal government as a result of the USPSP. Appendix B provides the spreadsheet models for each of the four sections that make up the USPSP, followed by its respective statistics and frequency charts.

Lost Tax Revenue due to Basic Pay for the Coast Guard in 2001

Coast Guard	Column 1 Total Members	Column 2 Column 1 x Probabilistic Participation Rate	Column 3 Annual Income	Column 4 Column 3 X Probabilistic Contribution Rate	Column 5 Product of Participants x Contributions	Column 6 Column 5 x .16 Tax Rate
E-1	698	87	12,065.62	361.97	31,581.76	$5,053.08
E-2	2,611	326	13,529.68	405.89	132,472.48	$21,195.60
E-3	3,472	434	14,915.80	447.47	194,203.72	$31,072.59
E-4	6,069	759	17,760.30	532.81	404,202.14	$64,672.34
E-5	5,634	704	21,604.27	648.13	456,444.13	$73,031.06
E-6	5,317	665	25,239.65	757.19	503,247.03	$80,519.53
E-7	2,657	332	30,771.45	923.14	306,599.03	$49,055.85
E-8	535	67	36,305.53	1,089.17	72,837.97	$11,654.08
E-9	258	32	44,668.78	1,340.06	43,217.05	$6,914.73
W-1	0	0	29,112.39	873.37	0.00	$0.00
W-2	671	84	33,778.09	1,013.34	84,994.11	$13,599.06
W-3	388	49	41,132.34	1,233.97	59,847.55	$9,575.61
W-4	398	50	50,578.81	1,517.36	75,488.88	$12,078.22
W-5	0	0	59,124.73	1,773.74	0.00	$0.00
O-1	544	68	24,190.98	725.73	49,349.61	$7,895.94
O-2	939	117	33,431.76	1,002.95	117,721.58	$18,835.45
O-3	1,897	237	43,263.74	1,297.91	307,767.40	$49,242.78
O-4	1,064	133	54,031.83	1,620.96	215,587.02	$34,493.92
O-5	722	90	63,308.90	1,899.27	171,408.85	$27,425.42
O-6	316	40	81,835.75	2,455.07	96,975.37	$15,516.06
O-7	13	2	95,824.93	2,874.75	4,671.47	$747.43
O-8	14	2	108,576.99	3,257.31	5,700.29	$912.05
O-9	4	1	116,013.60	3,480.41	1,740.20	$278.43
O-10	1	0	116,013.60	3,480.41	0.00	$0.00
					2001 Forecast:	**$533,769.22**

Table 5.2. Calculations for the Coast Guard for the Year 2001.

Once the simulation is completed, the most significant statistical results are the mean, the standard deviation, and the frequency chart. For the Coast Guard example, the simulation results from 2001 to 2009 are summed up to equal the mean, or most expected value, which equals $11,042,310 dollars of lost tax revenue. The standard deviation equals $1,106,139 dollars, and this represents where the majority of end values are relative to the mean. Following the empirical rule for most data sets where the mean and median are almost the same, approximately two out of three observations (end values), or 67 percent, are within one standard deviation of the mean. Two standard deviations capture approximately 95 percent of the observations. [Ref. 46:p. 158] The frequency chart represents the new probability curve, and is basically a series of bar graphs that shows the frequency, or the number of times, that each trial produced the same result. The highest bar graph signifies a range of end values that normally contains the mean, or most expected value. Figure 5.4 depicts the frequency chart for the Coast Guard's lost tax revenue in the years 2001-2009, referring only to basic pay.

D. MODEL RESULTS

Probably one of the best ways to show the probabilistic outcome of the Monte Carlo simulations is to compare it relative to the Directorate's forecast. Table 5.3 below shows the mean dollar values of DoD basic pay, Coast Guard basic pay, bonus pay, and Ready Reserve pay placed alongside its respective counterpart from the Directorate's forecast.

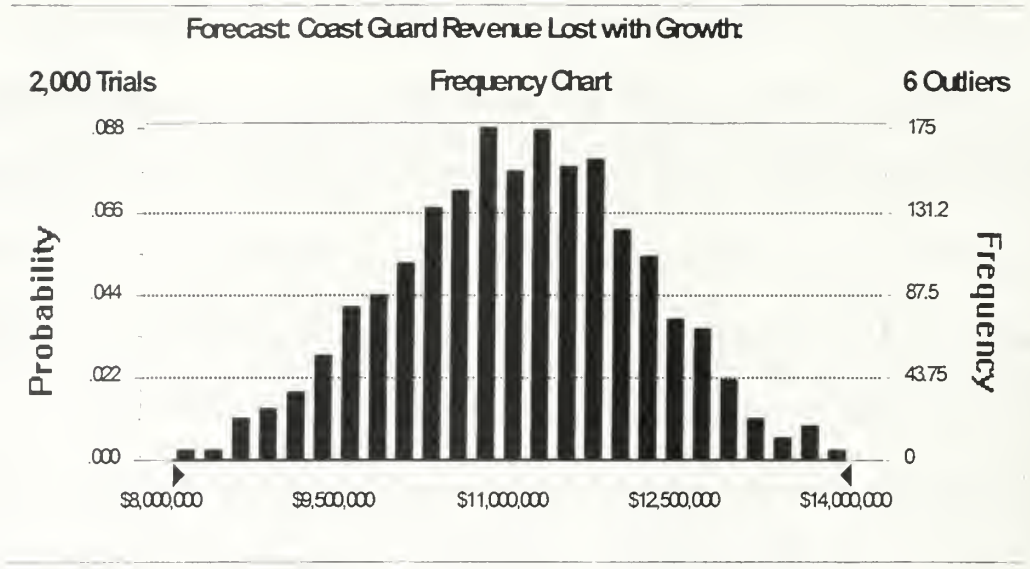


Figure 5.4. Frequency Chart for the Coast Guard's Lost Tax Revenue from 2001-2009.

	DoD Estimate	Simulation Mean
DoD Basic Pay	435,898,420	423,813,564
Coast Guard Basic Pay	11,440,399	11,042,310
Bonus Pay	10,574,937	10,671,541
Ready Reserve Pay	26,066,696	26,078,980
Total	**483,980,452**	**471,606,395**
Amount Difference		12,374,057
Percent Difference		2.6%

Table 5.3. Comparison of Simulations and DoD's Estimate of Lost Tax Revenue

The minor 2.6 percent difference between the Directorate's estimate and the Monte Carlo simulations may be largely due to the probabilistic assumptions that were defined prior to running the simulations. Since triangular probability distributions were used, the tendency of the observations gravitated to the "most likely" values. These most likely values were the same deterministic values used by the Directorate. Therefore, despite using Monte Carlo's random number generator, the propensity of numbers

"scattered or dispersed" around the most likely value. Furthermore, the small percent difference also shows that the probabilistic spreadsheet model for forecasting lost tax revenue is valid, and can be used for related cost estimation.

Still the probabilistic outcome for lost tax revenue due to the USPSP has significant merit to the decision maker. Using the simulations' output for the USPSP, specifically the frequency chart, mean, and standard deviation, the operator can find out some critical information not previously known by using a deterministic method.

Three cases will be described to reinforce as well as clarify the potential value of using a probabilistic approach. The first case occurs when the decision or policy maker wants to know what the chances of the total USPSP tax revenue lost being between $400 million and $500 million. Using the frequency chart from the total tax revenue lost due to the USPSP, the analyst can manipulate the original range of lost tax dollar values in order for the computer program to automatically provide a customized "percentage of likelihood". In this case, this level of certainty equals 70.55 percent and is shown in Figure 5.5 below.

Similarly, case two requires that another report be generated, but this time with equal ranges of $50 million dollars from the mean. In particular, the range from $425 million dollars to $525 million dollars was used and its resulting percentage of likelihood equaled 76.55 percent. Figure 5.6 applies to this second case.

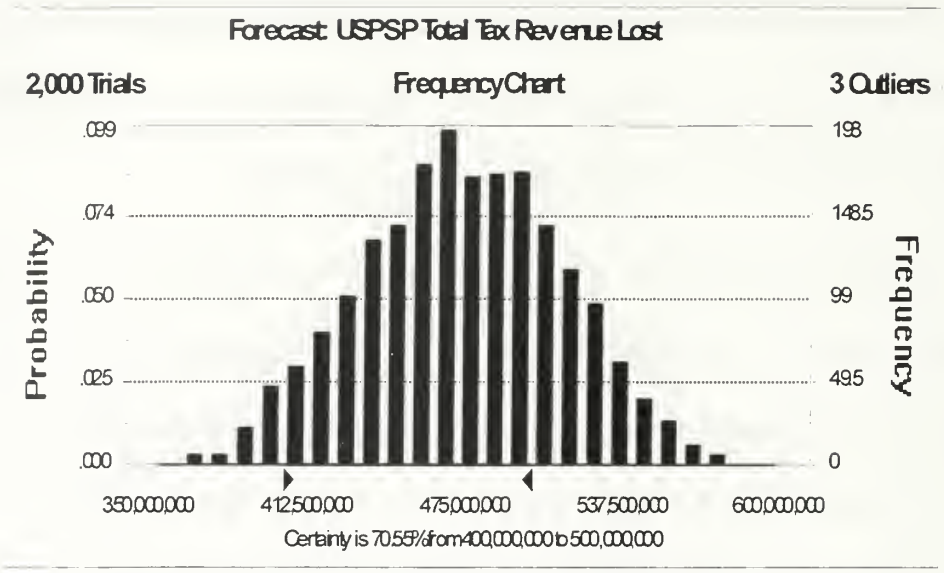


Figure 5.5. Monte Carlo Case One for Lost Tax Revenue due to the USPSP.

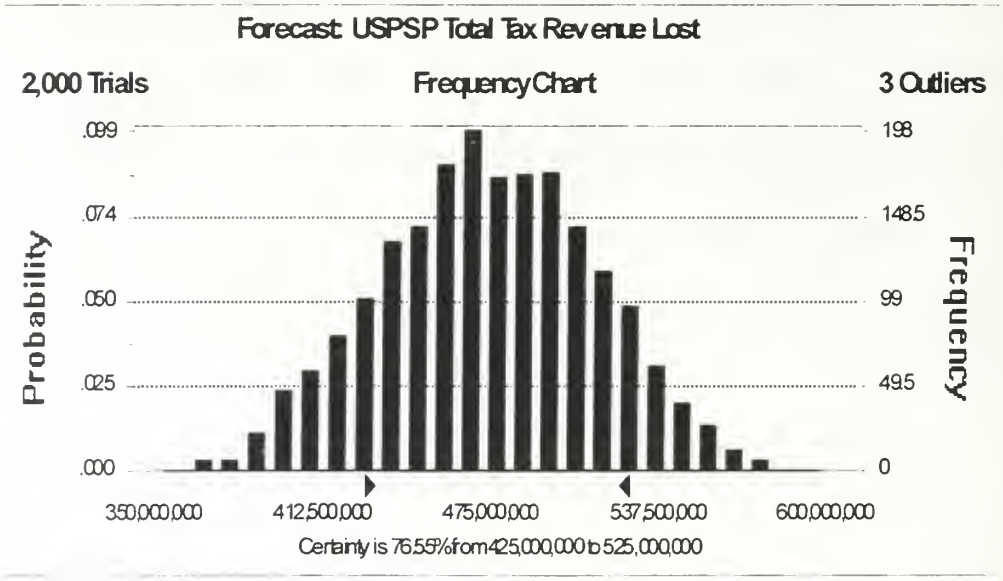


Figure 5.6. Monte Carlo Case Two for Lost Tax Revenue due to the USPSP.

The last scenario, case three, uses standard deviation. One standard deviation captures approximately 67 percent of the observations. Using the USPSP's mean of

$471,606,395 dollars and adding the USPSP's standard deviation of $40,755,477 dollars resulted in $512 million dollars. Then subtracting the standard deviation from the mean resulted in $430 million dollars. Within this new range, a resulting level of certainty equaled 66.6%. Figure 5.7 shows this third case's probability curve.

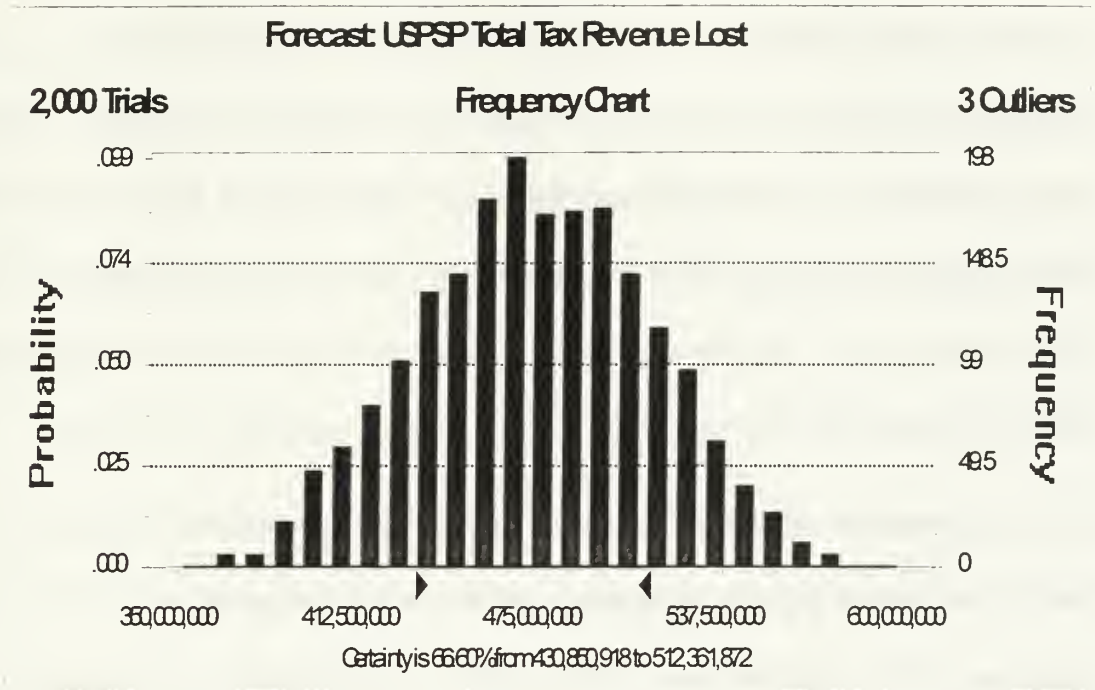


Figure 5.7. Monte Carlo Case Three for Lost Tax Revenue due to the USPSP.

Table 5.4 below provides the three possible scenarios, given the requested range of values and its appropriate percentage of certainty. Appendix C shows the three cases' statistical information and frequency charts.

New Range of Lost Tax Revenue	Percentage
Case 1: 400-500 million dollars	70.55%
Case 2: 425-525 million dollars	76.55%
Case 3: 430-512 million dollars or (1) standard deviation	66.60%

Table 5.4. Likelihood of Achieving a Range of Lost Tax Revenue Due to the USPSP.

E. SUMMARY

Spreadsheet modeling and Monte Carlo simulation provide the analyst with a potent forecasting tool that can take into account uncertainty. Besides the obvious advantages of saving time and funding, Monte Carlo simulation allows numerous probabilistic input factors to be considered while building the forecast model. Further, the output it produces is based on a likelihood of reaching a pre-set target. In other words, instead of the deterministic answer of lost tax revenue of $483 million dollars, Monte Carlo simulation provides the probabilistic answer of lost tax revenue of $472 million dollars, which includes an almost 71 percent likelihood of being within a range of $400 million and $500 million dollars.

In summary, when a policy is determined or major decisions must be made, the use of a systematic and formal decision making model that incorporates Monte Carlo simulation is more relevant since such a model can quantify uncertainties. Further, by quantifying these uncertainties, a decision maker reduces risk, obtains a better overall picture of the given problem, and therefore provides a competitive advantage to his organization. [Ref. 48, p. 3.]

VI. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

The purpose of this research was to determine the advantages and disadvantages of establishing a Defined Contribution (DC) plan into the current military retirement system. Further, the objective of the research was to determine the costs of the DC plan and how it would impact military retirement. Through the course of this study, the following deductions were made in reference to DC plans, the USPSP, and cost estimation.

B. DEFINED CONTRIBUTION PLANS

The private sector has realized the value of a defined contribution plan vice the traditional defined benefit plan. With the implementation, popularity and versatility of 401(k) plans, the employees of a company are empowered with a long-term savings device with built-in federal tax advantages. The advantages of a DC plan are its portability, which becomes paramount in the current times of changing jobs, automatic salary deductions, and depending on the organization, employer matching, where the employer matches employee contributions, dollar for dollar, or a percentage thereof. Conversely, the shortfalls of a DC plan are that the 401(k) contributions and earnings are subject to the economy or market forces. Also, the ability to withdraw funds either for hardship cases or upon changing jobs provides a tempting opportunity to use the 401(k) balance in the short term (e.g. new car, vacation, or diamond ring). Lastly, and in

comparison to a defined benefit plan, there are no ancillary benefits – disability or money for a surviving spouse – just the accumulated value of the 401(k) plan. [Ref. 48:pp. 50-51]

In the larger scheme of things, a DC plan grants employees the ability to make their own financial decisions. In short, the burden of responsibility for providing a pension falls upon the employee vice the employer who sponsors a defined benefit plan.

C. UNIFORMED SERVICES PAYROLL SAVINGS PLAN

With the signing of the National Defense Authorization Act for fiscal year 2000, policy makers opened the door for a DC plan for the uniformed services. This DC plan was based upon the federal civilian employees' existing Thrift Savings Plan or TSP. Although this military TSP was not initiated in the year 2000 due to PAYGO considerations, the opportunity for the Uniformed Services Payroll Savings Plan was active. On October 30, 2000, the National Defense Authorization Act for fiscal year 2001 was approved. This act stipulated that PAYGO was no longer required for the USPSP, and the current military retirement system remained intact.

Once implemented, the USPSP provides an additional competitive advantage when compared to private sector organizations. In relation to military demographics, the USPSP affects three groups of personnel: the individuals thinking about joining the uniformed services (potential recruits), the members who are in mid-career, and the members who will complete at least 20 years of service and retire. For recruits, the USPSP places the military on equal parity with its civilian counterparts in regard to the

total compensation package. For mid-careerists, the USPSP provides an added financial boost and gives some incentive to stay in the military until retirement age. The plan also encourages financial responsibility where previously there was none; the responsibility of the defined benefit pension lay upon the government. Lastly, upcoming military retirees now have a three-tier program similar to their federal equivalents. The USPSP acts as the third DC leg, while the other two legs are the defined benefit pension and Social Security.

D. DATA ANALYSES

The focus of determining the costs of the military TSP or USPSP predominate on lost or deferred tax revenue. This occurs as a result of the pre-tax contributions into the plan, which are normally annual tax dollars. The lost tax dollar cost estimates are deterministic, that is, the forecasts are based on known inputs. In particular, two cost estimates were carried out and based on the same model, specifically the federal employees of the CSRS. The DoD Directorate of Compensation predicted a loss of $483 million dollars from 2001-2009; and the Congressional Budget Office predicted a loss of $980 million dollars for the same period.

The results of this research recommend the use of a probabilistic model for forecasting cost estimates. This type of model uses Monte Carlo simulation and a random number generator. The model allows for multiple inputs that have a range of individual probabilities. This range of likelihood represents a distribution of values, of which the analyst can choose the most appropriate form (normal, beta, custom distributions).

While in the end decision-making will always be a judgmental process, a probabilistic model that offers a most expected value and the probability of reaching that figure carries more importance than just a single number. One of the best advantages of probabilistic models and simulation is that it changes the way management currently thinks, and how management quantifies risk. In other words, probabilistic models provide a means to address uncertainty.

E. SUGGESTED FURTHER STUDIES

The USPSP represents a form of military compensation. While not specifically addressed in this research, the costs of maintaining the uniformed services defined benefit pension plan are a significant part of the United States annual budget. With the prevailing popularity of DC plans, a gradual departure from the defined benefit plan to the DC plan should provide considerable cost savings. This is recommended as an area for further research.

In the National Defense Authorization Act for fiscal year 2001, the services have the option of offering matching contributions similar to privately held companies. While government matching incurs an additional six years of service, the costs of matching funds are difficult to predict and are not based on a proven model. Another suggestion for future research would be the probabilistic cost model for matching funds.

APPENDIX A. DATA FROM THE DOD DIRECTORATE OF COMPENSATION

This appendix contains the original data from the DoD Directorate of Compensation at the Pentagon. The USPSP forecast is made up of Coast Guard basic pay, DoD basic pay, Bonus pay, and Ready Reserve pay. The cost of implementing the USPSP consists of lost/deferred tax revenue during the period 2000-2009.

USPSP Total Tax Revenue Lost from 2000-2009

Year	DoD Basic Pay	Coast Guard	Bonus Pay	Reserves	Total Annual Revenue
2001	21,452,662	560,191	596,880	818,001	23,427,733
2002	27,771,758	725,200	737,685	1,280,989	30,515,633
2003	36,475,964	952,492	917,406	1,783,137	40,129,000
2004	43,277,668	1,147,387	1,077,669	2,326,994	47,829,718
2005	50,436,112	1,357,588	1,215,450	2,915,258	55,924,408
2006	58,533,751	1,528,484	1,351,719	3,550,785	64,964,740
2007	62,790,752	1,639,647	1,468,530	4,058,040	69,956,968
2008	65,983,502	1,723,019	1,559,376	4,463,844	73,729,740
2009	69,176,252	1,806,391	1,650,222	4,869,648	77,502,512
	435,898,420	**11,440,399**	**10,574,937**	**26,066,696**	**483,980,452**

Total Tax Revenue Lost due to Coast Guard

Rates	2001	2002	2003	2004	2005	2006	2007	2008	2009
Participation	0.125	0.155	0.195	0.225	0.255	0.275	0.295	0.31	0.325
Contribution	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Growth	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Tax Rate	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16

Pay Grade	Service Members	Annual Pay 2000	Forecast 2001	2002	2003	2004	2005	2006	2007	2008	2009
E-1	698	12,066	5,053	6,266	7,883	9,096	10,308	11,117	11,925	12,532	13,138
E-2	2,611	13,530	21,196	26,283	33,065	38,152	43,239	46,630	50,022	52,565	55,109
E-3	3,472	14,916	31,073	38,530	48,473	55,931	63,388	68,360	73,331	77,060	80,789
E-4	6,069	17,760	64,672	80,194	100,889	116,410	131,932	142,279	152,627	160,387	168,148
E-5	5,634	21,604	73,031	90,559	113,928	131,456	148,983	160,668	172,353	181,117	189,881
E-6	5,317	25,240	80,520	99,844	125,610	144,935	164,260	177,143	190,026	199,688	209,351
E-7	2,657	30,771	49,056	60,829	76,527	88,301	100,074	107,923	115,772	121,658	127,545
E-8	535	36,306	11,654	14,451	18,180	20,977	23,774	25,639	27,504	28,902	30,301
E-9	258	44,669	6,915	8,574	10,787	12,447	14,106	15,212	16,319	17,149	17,978
W-1	0	29,112	0	0	0	0	0	0	0	0	0
W-2	671	33,778	13,599	16,863	21,215	24,478	27,742	29,918	32,094	33,726	35,358
W-3	388	41,132	9,576	11,874	14,938	17,236	19,534	21,066	22,598	23,748	24,897
W-4	398	50,579	12,078	14,977	18,842	21,741	24,640	26,572	28,505	29,954	31,403
W-5	0	59,125	0	0	0	0	0	0	0	0	0
O-1	544	24,191	7,896	9,791	12,318	14,213	16,108	17,371	18,634	19,582	20,529
O-2	939	33,432	18,835	23,356	29,383	33,904	38,424	41,438	44,452	46,712	48,972
O-3	1,897	43,264	49,243	61,061	76,819	88,637	100,455	108,334	116,213	122,122	128,031
O-4	1,064	54,032	34,494	42,772	53,811	62,089	70,368	75,887	81,406	85,545	89,684
O-5	722	63,309	27,425	34,008	42,784	49,366	55,948	60,336	64,724	68,015	71,306
O-6	316	81,836	15,516	19,240	24,205	27,929	31,653	34,135	36,618	38,480	40,342
O-7	13	95,825	747	927	1,166	1,345	1,525	1,644	1,764	1,854	1,943
O-8	14	108,577	912	1,131	1,423	1,642	1,861	2,007	2,152	2,262	2,371
O-9	4	116,014	278	345	434	501	568	613	657	691	724
O-10	1	116,014	70	86	109	125	142	153	164	173	181
Annual Tax Revenue Lost:			535,840	663,962	834,792	962,914	1,091,036	1,176,451	1,261,867	1,325,928	1,389,990
Tax Revenue Lost w/Growth:			559,417	723,676	949,904	1,143,904	1,353,137	1,523,270	1,633,866	1,716,813	1,799,760

Coast Guard Revenue Lost:	$9,242,780
Coast Guard Revenue Lost w/Growth:	$11,403,747

DoD Total Tax Revenue lost due to Basic Pay

Rates	2001	2002	2003	2004	2005	2006	2007	2008	2009
Participation	0.125	0.155	0.195	0.225	0.255	0.275	0.295	0.310	0.325
Contribution	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Growth	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Tax Rate	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16

Pay Grade*	Service Members	Annual Pay 2000	Forecast 2001	2002	2003	2004	2005	2006	2007	2008	2009
E-1/E-2	163,384	12,498	1,225,145	1,519,179	1,911,226	2,205,261	2,499,295	2,695,318	2,891,342	3,038,359	3,185,376
E-3	180,582	15,132	1,639,540	2,033,030	2,557,683	2,951,172	3,344,662	3,606,988	3,869,315	4,066,059	4,262,804
E-4	127,797	17,364	1,331,440	1,650,986	2,077,047	2,396,592	2,716,138	2,929,169	3,142,199	3,301,972	3,461,745
E-4	90,605	18,240	991,581	1,229,561	1,546,867	1,784,846	2,022,825	2,181,478	2,340,131	2,459,121	2,578,111
E-4	65,213	19,128	748,437	928,061	1,167,561	1,347,186	1,526,811	1,646,560	1,766,310	1,856,123	1,945,935
E-5	37,326	19,680	440,745	546,524	687,563	793,342	899,121	969,640	1,040,159	1,093,049	1,145,938
E-5	50,907	20,580	628,600	779,464	980,615	1,131,479	1,282,343	1,382,919	1,483,495	1,558,927	1,634,359
E-5	34,563	21,480	445,448	552,355	694,899	801,806	908,714	979,985	1,051,257	1,104,711	1,158,165
E-5	42,933	22,344	575,577	713,715	897,900	1,036,039	1,174,177	1,266,269	1,358,362	1,427,431	1,496,500
E-5	73,173	23,232	1,019,973	1,264,767	1,591,158	1,835,952	2,080,745	2,243,941	2,407,136	2,529,533	2,651,930
E-6	20,126	22,788	275,179	341,222	429,279	495,322	561,365	605,393	649,422	682,443	715,465
E-6	20,719	23,676	294,326	364,964	459,148	529,786	600,425	647,517	694,609	729,928	765,247
E-6	24,652	24,564	363,331	450,530	566,796	653,996	741,195	799,328	857,461	901,061	944,661
E-6	29,818	25,428	454,927	564,110	709,687	818,869	928,052	1,000,840	1,073,628	1,128,220	1,182,811
E-6	29,220	26,304	461,162	571,841	719,412	830,091	940,770	1,014,556	1,088,342	1,143,681	1,199,020
E-6	20,771	26,940	335,742	416,321	523,758	604,336	684,915	738,633	792,352	832,641	872,930
E-6	16,963	27,396	278,831	345,750	434,976	501,896	568,815	613,428	658,041	691,501	724,961
E-7	23,658	29,268	415,453	515,162	648,107	747,816	847,525	913,997	980,470	1,030,324	1,080,179
E-7	22,035	30,168	398,851	494,575	622,208	717,932	813,656	877,472	941,289	989,151	1,037,013
E-7	26,439	31,056	492,654	610,891	768,540	886,777	1,005,014	1,083,838	1,162,663	1,221,781	1,280,900
E-7	25,803	31,920	494,179	612,782	770,919	889,522	1,008,125	1,087,194	1,166,263	1,225,564	1,284,866
E-8	9,719	35,196	205,242	254,500	320,177	369,436	418,694	451,532	484,371	509,000	533,629
E-8	8,587	36,312	187,087	231,987	291,855	336,756	381,657	411,591	441,525	463,975	486,425
E-8	5,437	37,932	123,742	153,440	193,037	222,735	252,433	272,232	292,031	306,880	321,729
E-8	2,435	39,552	57,785	71,654	90,145	104,014	117,882	127,128	136,374	143,308	150,242
E-8	611	41,808	15,327	19,005	23,910	27,588	31,267	33,719	36,171	38,010	39,850
E-9	1,681	41,976	42,034	52,123	65,574	75,662	85,750	92,476	99,201	104,245	109,289
E-9	2,188	43,308	56,855	70,500	88,693	102,339	115,984	125,080	134,177	141,000	147,822
E-9	2,482	44,928	66,907	82,964	104,375	120,432	136,490	147,195	157,900	165,929	173,958
E-9	4,064	46,992	114,585	142,086	178,753	206,254	233,754	252,088	270,421	284,172	297,922
Ann.Tax Rev. Lost:		856,890	14,180,885	17,584,050	22,121,869	25,525,233	28,928,598	31,197,507	33,466,417	35,168,099	38,869,781

(Continued on next page)

*Multiple pay grades are due to varying years of service (YOS)

DoD Total Tax Revenue lost due to Basic Pay

Rates	2001	2002	2003	2004	2005	2006	2007	2008	2009
Participation	0.125	0.155	0.195	0.225	0.255	0.275	0.295	0.310	0.325
Contribution	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Growth	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Tax Rate	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16

Pay Grade*	Service Members	Annual Pay 2000	Forecast 2001	2002	2003	2004	2005	2006	2007	2008	2009
W-1	2,451	29,196	42,936	53,240	66,980	77,284	87,589	94,458	101,328	106,480	111,633
W-2	6,305	34,128	129,106	160,092	201,406	232,391	263,377	284,034	304,691	320,183	335,676
W-3	4,102	41,028	100,978	125,213	157,526	181,761	205,995	222,152	238,308	250,426	262,543
W-4	2,065	49,872	61,791	76,621	96,395	111,225	126,054	135,941	145,828	153,243	160,658
W-5	476	59,244	16,920	20,981	26,395	30,456	34,517	37,224	39,931	41,962	43,992
O-1	14,884	23,112	206,399	255,935	321,983	371,519	421,055	454,079	487,103	511,871	536,638
O-1	7,146	24,060	103,160	127,918	160,929	185,687	210,446	226,951	243,457	255,836	268,215
O-2	15,563	34,932	326,188	404,473	508,853	587,138	665,424	717,614	769,804	808,946	848,089
O-2	4,328	36,108	93,765	116,269	146,274	168,777	191,281	206,284	221,286	232,538	243,790
O-2	3,936	36,852	87,030	107,917	135,766	156,653	177,541	191,465	205,390	215,834	226,277
O-3	19,949	40,380	483,324	599,322	753,986	869,984	985,982	1,063,314	1,140,646	1,198,644	1,256,643
O-3	15,221	42,312	386,419	479,159	602,813	695,553	788,294	850,121	911,948	958,318	1,004,688
O-3	15,183	44,424	404,694	501,820	631,322	728,449	825,575	890,326	955,077	1,003,641	1,052,204
O-3	10,879	46,200	301,566	373,942	470,443	542,819	615,194	663,445	711,695	747,883	784,071
O-3	4,733	48,480	137,674	170,715	214,771	247,812	280,854	302,882	324,909	341,430	357,951
O-3	10,821	49,668	322,474	399,868	503,060	580,454	657,848	709,444	761,040	799,737	838,434
O-4	3,343	45,744	91,753	113,774	143,135	165,156	187,177	201,857	216,538	227,548	238,559
O-4	2,098	47,760	60,120	74,549	93,788	108,217	122,645	132,265	141,884	149,098	156,313
O-4	4,645	51,036	142,237	176,374	221,890	256,027	290,164	312,922	335,680	352,749	369,817
O-4	9,820	53,568	315,623	391,372	492,371	568,121	643,870	694,370	744,869	782,744	820,619
O-4	10,511	55,332	348,957	432,706	544,373	628,122	711,872	767,705	823,538	865,413	907,288
O-4	6,716	57,108	230,122	285,352	358,991	414,220	469,450	506,269	543,089	570,704	598,318
O-4	8,174	57,708	283,023	350,949	441,516	509,442	577,367	622,651	667,935	701,897	735,860
O-5	5,975	51,504	184,642	228,956	288,041	332,355	376,669	406,212	435,755	457,912	480,069
O-5	620	53,052	19,735	24,472	30,787	35,524	40,260	43,418	46,575	48,944	51,312
O-5	478	55,908	16,034	19,883	25,014	28,862	32,710	35,276	37,841	39,765	41,689
O-5	497	59,664	17,792	22,062	27,755	32,025	36,295	39,142	41,989	44,124	46,259
O-5	3,445	63,432	131,114	162,581	204,538	236,005	267,472	288,451	309,429	325,163	340,896
O-5	5,821	65,232	227,829	282,508	355,414	410,093	464,772	501,224	537,677	565,017	592,356
O-5	5,195	67,008	208,864	258,991	325,828	375,955	426,082	459,501	492,919	517,983	543,046
O-5	6,622	69,024	274,246	340,065	427,824	493,643	559,462	603,342	647,221	680,130	713,040
O-6	1,231	76,572	56,556	70,130	88,227	101,801	115,374	124,423	133,472	140,259	147,046
O-6	2,076	78,588	97,889	121,383	152,707	176,201	199,694	215,356	231,019	242,765	254,512
O-6	2,925	80,628	141,502	175,463	220,743	254,704	288,664	311,305	333,945	350,925	367,906
O-6	5,087	84,588	258,179	320,143	402,760	464,723	526,686	567,995	609,304	640,285	671,267
O-7	878	108,576	57,198	70,925	89,229	102,956	116,684	125,835	134,987	141,851	148,714
Annual Tax Revenue Lost:			20,548,527	25,480,173	32,055,701	36,987,348	41,918,994	45,206,758	48,494,523	50,960,346	53,426,169
Tax Revenue Lost with 4.4% Growth:			21,452,662	27,771,758	36,475,964	43,939,508	51,989,225	58,533,751	62,790,752	65,983,502	69,176,252

DoD Total Revenue Lost:	355,078,539
DoD Total Revenue Lost with Growth:	438,113,373

*Multiple pay grades are due to varying years of service (YOS)

Total Tax Revenue Lost due to Bonus Pay

Bonus Type	Contrib. Rate	Range of Participation Rates								
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
SRB	0.03	0.10	0.13	0.16	0.19	0.22	0.25	0.28	0.30	0.32
ACP	0.03	0.15	0.18	0.23	0.27	0.30	0.33	0.35	0.37	0.39
Nuke	0.03	0.15	0.18	0.23	0.27	0.30	0.33	0.35	0.37	0.39
SWO	0.03	0.15	0.18	0.23	0.27	0.30	0.33	0.35	0.37	0.39
MSP	0.03	0.30	0.33	0.36	0.39	0.40	0.40	0.40	0.40	0.40
EB	0.03	0.10	0.13	0.16	0.19	0.22	0.25	0.28	0.30	0.32
NUKE	0.03	0.15	0.18	0.23	0.27	0.30	0.33	0.35	0.37	0.39
NURSE	0.03	0.15	0.18	0.23	0.27	0.30	0.33	0.35	0.37	0.39
	Amt (000s)									
SRB	366,200	357,045	357,045	357,045	357,045	357,045	357,045	357,045	357,045	357,045
ACP	375,700	482,775	482,775	482,775	482,775	482,775	482,775	482,775	482,775	482,775
Nuke	28,700	36,880	36,880	36,880	36,880	36,880	36,880	36,880	36,880	36,880
SWO	21,800	28,013	28,013	28,013	28,013	28,013	28,013	28,013	28,013	28,013
MSP	33,600	56,784	56,784	56,784	56,784	56,784	56,784	56,784	56,784	56,784
EB	210,800	205,530	205,530	205,530	205,530	205,530	205,530	205,530	205,530	205,530
NUKE	3,900	5,012	5,012	5,012	5,012	5,012	5,012	5,012	5,012	5,012
NURSE	2,300	2,956	2,956	2,956	2,956	2,956	2,956	2,956	2,956	2,956
Annual Tax Rev. Lost:		1,174,993	1,174,993	1,174,993	1,174,993	1,174,993	1,174,993	1,174,993	1,174,993	1,174,993

Total Tax Revenue Lost due to Bonus Pay: 10,574,937

Legend:		
	SRB	Selective Re-enlistment Bonus
	ACP	Aviation Continuity Pay
	Nuke	Nuclear officer incentive pay
	SWO	Surface Warfare Officer Bonus Pay
	MSP	Multi-year Special Pay (Doctors, Health Care Profesionals)
	EB	Enlistment Bonus
	NUKE	Nuclear Accession Bonus
	NURSE	Nurses Bonus

Ready Reserves Forecast of Lost Tax Revenue

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Participation Rate	5.0%	7.5%	10.0%	15.0%	15.0%	17.5%	20.0%	22.0%	24.0%
Service Numbers 824,764	41,238	61,857	82,476	123,715	123,715	144,334	164,953	181,448	197,943
Annual Tax Revenue Loss:	**783,526**	**1,175,289**	**1,567,052**	**2,350,577**	**2,350,577**	**2,742,340**	**3,134,103**	**3,447,514**	**3,760,924**
Total Tax Revenue Loss:									**21,311,902**

APPENDIX B. RESULTS OF MONTE CARLO SIMUATIONS

This appendix contains the results of Monte Carlo simulations that were carried out using probabilistic input variables and the DoD Directorate of Compensation's cost data. The simulations were carried out to forecast the lost or deferred tax revenue of the USPSP over the period 2000-2009. The simulations cover four sections: the Ready Reserves, Bonus pay, Coast Guard basic pay, and DoD basic pay.

Monte Carlo Simulation

Ready Reserves Forecast of Lost Tax Revenue

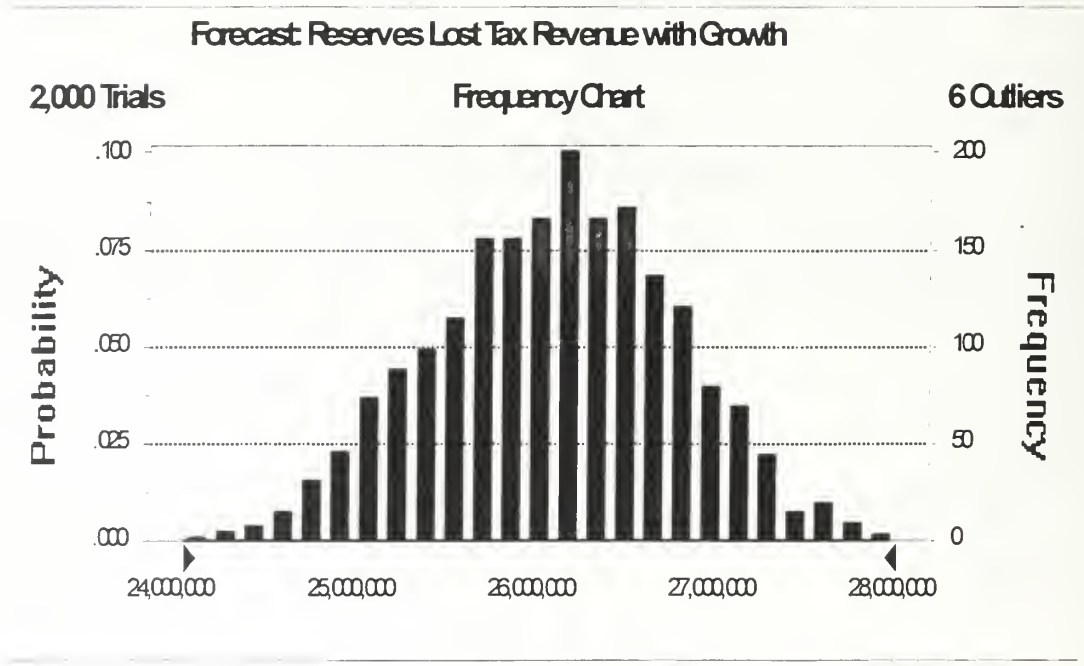
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Participation Rate	5.0%	7.5%	10.0%	15.0%	15.0%	17.5%	20.0%	22.0%	24.0%
Service Numbers									
824,764	41,238	61,857	82,476	123,715	123,715	144,334	164,953	181,448	197,943
Annual Tax Revenue Loss:	**783,526**	**1,175,289**	**1,567,052**	**2,350,577**	**2,350,577**	**2,742,340**	**3,134,103**	**3,447,514**	**3,760,924**
Total Tax Revenue Loss:									**21,311,902**

Forecast: Reserves' Lost Tax Revenue with Growth

Summary:

Display Range is from 24,000,000 to 28,000,000
Entire Range is from 23,802,753 to 28,223,410
After 2,000 Trials, the Std. Error of the Mean is 15,446

Statistics:	Value
Trials	2000
Mean	26,078,980
Median	26,103,979
Standard Deviation	690,761



Monte Carlo Simulation
Total Tax Revenue Lost due to Coast Guard

Rates	2001	2002	2003	2004	2005	2006	2007	2008	2009
Participation	0.125	0.155	0.195	0.225	0.255	0.275	0.295	0.31	0.325
Contribution	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Growth	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
Tax Rate	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16

Pay Grade	Service Members	Annual Pay 2000	Forecast 2001	2002	2003	2004	2005	2006	2007	2008	2009
E-1	698	12,066	5,053	6,266	7,883	9,096	10,308	11,117	11,925	12,532	13,138
E-2	2,611	13,530	21,196	26,283	33,065	38,152	43,239	46,630	50,022	52,565	55,109
E-3	3,472	14,916	31,073	38,530	48,473	55,931	63,388	68,360	73,331	77,060	80,789
E-4	6,069	17,760	64,672	80,194	100,889	116,410	131,932	142,279	152,627	160,387	168,148
E-5	5,634	21,604	73,031	90,559	113,928	131,456	148,983	160,668	172,353	181,117	189,881
E-6	5,317	25,240	80,520	99,844	125,610	144,935	164,260	177,143	190,026	199,688	209,351
E-7	2,657	30,771	49,056	60,829	76,527	88,301	100,074	107,923	115,772	121,658	127,545
E-8	535	36,306	11,654	14,451	18,180	20,977	23,774	25,639	27,504	28,902	30,301
E-9	258	44,669	6,915	8,574	10,787	12,447	14,106	15,212	16,319	17,149	17,978
W-1	0	29,112	0	0	0	0	0	0	0	0	0
W-2	671	33,778	13,599	16,863	21,215	24,478	27,742	29,918	32,094	33,726	35,358
W-3	388	41,132	9,576	11,874	14,938	17,236	19,534	21,066	22,598	23,748	24,897
W-4	398	50,579	12,078	14,977	18,842	21,741	24,640	26,572	28,505	29,954	31,403
W-5	0	59,125	0	0	0	0	0	0	0	0	0
O-1	544	24,191	7,896	9,791	12,318	14,213	16,108	17,371	18,634	19,582	20,529
O-2	939	33,432	18,835	23,356	29,383	33,904	38,424	41,438	44,452	46,712	48,972
O-3	1,897	43,264	49,243	61,061	76,819	88,637	100,455	108,334	116,213	122,122	128,031
O-4	1,064	54,032	34,494	42,772	53,811	62,089	70,368	75,887	81,406	85,545	89,684
O-5	722	63,309	27,425	34,008	42,784	49,366	55,948	60,336	64,724	68,015	71,306
O-6	316	81,836	15,516	19,240	24,205	27,929	31,653	34,135	36,618	38,480	40,342
O-7	13	95,825	747	927	1,166	1,345	1,525	1,644	1,764	1,854	1,943
O-8	14	108,577	912	1,131	1,423	1,642	1,861	2,007	2,152	2,262	2,371
O-9	4	116,014	278	345	434	501	568	613	657	691	724
O-10	1	116,014	70	86	109	125	142	153	164	173	181
Annual Tax Revenue Lost:			535,840	663,962	834,792	962,914	1,091,036	1,176,451	1,261,867	1,325,928	1,389,990
Tax Revenue Lost w/Growth:			559,417	723,676	949,904	1,143,904	1,353,137	1,523,270	1,633,866	1,716,813	1,799,760

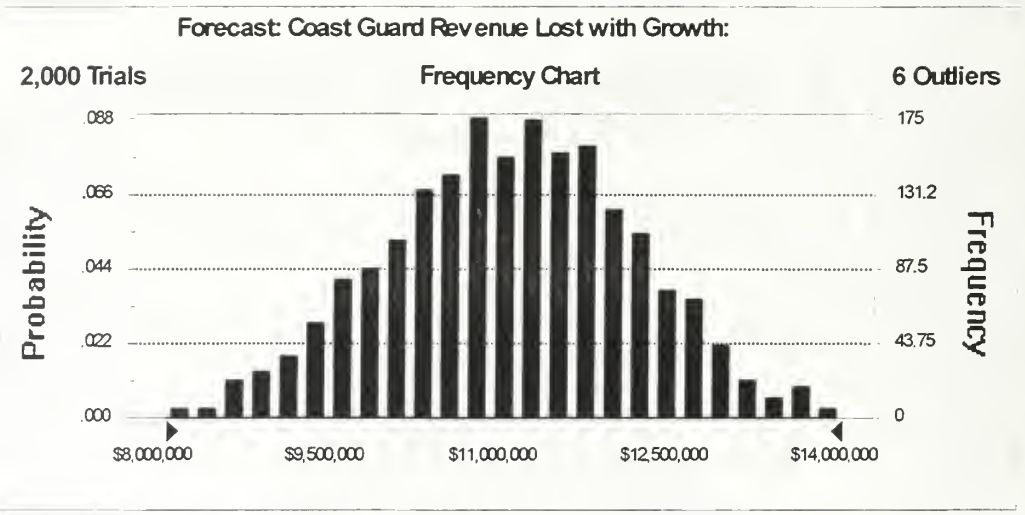
Coast Guard Revenue Lost:	$9,242,780
Coast Guard Revenue Lost w/Growth:	$11,403,747

Forecast: Coast Guard Tax Revenue Lost with Growth

Summary:

Display Range is from $8,000,000 to $14,000,000
Entire Range is from $7,583,785 to $14,022,753
After 2,000 Trials, the Std. Error of the Mean is $24,734

Statistics:	Value
Trials	2000
Mean	$11,042,310
Median	$11,071,661
Standard Deviation	$1,106,139



Monte Carlo Simulation
DoD Total Tax Revenue lost due to Basic Pay

		Rates	2001	2002	2003	2004	2005	2006	2007	2008	2009
		Participation	0.125	0.155	0.195	0.225	0.255	0.275	0.295	0.310	0.325
		Contribution	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		Growth	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
		Tax Rate	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Pay Grade*	Service Members	Annual Pay 2000	Forecast								
			2001	2002	2003	2004	2005	2006	2007	2008	2009
E-1/E-2	163,384	12,498	1,225,145	1,519,179	1,911,226	2,205,261	2,499,295	2,695,318	2,891,342	3,038,359	3,185,376
E-3	180,582	15,132	1,639,540	2,033,030	2,557,683	2,951,172	3,344,662	3,606,988	3,869,315	4,066,059	4,262,804
E-4	127,797	17,364	1,331,440	1,650,986	2,077,047	2,396,592	2,716,138	2,929,169	3,142,199	3,301,972	3,461,745
E-4	90,605	18,240	991,581	1,229,561	1,546,867	1,784,846	2,022,825	2,181,478	2,340,131	2,459,121	2,578,111
E-4	65,213	19,128	748,437	928,061	1,167,561	1,347,186	1,526,811	1,646,560	1,766,310	1,856,123	1,945,935
E-5	37,326	19,680	440,745	546,524	687,563	793,342	899,121	969,640	1,040,159	1,093,049	1,145,938
E-5	50,907	20,580	628,600	779,464	980,615	1,131,479	1,282,343	1,382,919	1,483,495	1,558,927	1,634,359
E-5	34,563	21,480	445,448	552,355	694,899	801,806	908,714	979,985	1,051,257	1,104,711	1,158,165
E-5	42,933	22,344	575,577	713,715	897,900	1,036,039	1,174,177	1,266,269	1,358,362	1,427,431	1,496,500
E-5	73,173	23,232	1,019,973	1,264,767	1,591,158	1,835,952	2,080,745	2,243,941	2,407,136	2,529,533	2,651,930
E-6	20,126	22,788	275,179	341,222	429,279	495,322	561,365	605,393	649,422	682,443	715,465
E-6	20,719	23,676	294,326	364,964	459,148	529,786	600,425	647,517	694,609	729,928	765,247
E-6	24,652	24,564	363,331	450,530	566,796	653,996	741,195	799,328	857,461	901,061	944,661
E-6	29,818	25,428	454,927	564,110	709,687	818,869	928,052	1,000,840	1,073,628	1,128,220	1,182,811
E-6	29,220	26,304	461,162	571,841	719,412	830,091	940,770	1,014,556	1,088,342	1,143,681	1,199,020
E-6	20,771	26,940	335,742	416,321	523,758	604,336	684,915	738,633	792,352	832,641	872,930
E-6	16,963	27,396	278,831	345,750	434,976	501,896	568,815	613,428	658,041	691,501	724,961
E-7	23,658	29,268	415,453	515,162	648,107	747,816	847,525	913,997	980,470	1,030,324	1,080,179
E-7	22,035	30,168	398,851	494,575	622,208	717,932	813,656	877,472	941,289	989,151	1,037,013
E-7	26,439	31,056	492,654	610,891	768,540	886,777	1,005,014	1,083,838	1,162,663	1,221,781	1,280,900
E-7	25,803	31,920	494,179	612,782	770,919	889,522	1,008,125	1,087,194	1,166,263	1,225,564	1,284,866
E-8	9,719	35,196	205,242	254,500	320,177	369,436	418,694	451,532	484,371	509,000	533,629
E-8	8,587	36,312	187,087	231,987	291,855	336,756	381,657	411,591	441,525	463,975	486,425
E-8	5,437	37,932	123,742	153,440	193,037	222,735	252,433	272,232	292,031	306,880	321,729
E-8	2,435	39,552	57,785	71,654	90,145	104,014	117,882	127,128	136,374	143,308	150,242
E-8	611	41,808	15,327	19,005	23,910	27,588	31,267	33,719	36,171	38,010	39,850
E-9	1,681	41,676	42,034	52,123	65,574	75,662	85,750	92,476	99,201	104,245	109,289
E-9	2,188	43,308	56,855	70,500	88,693	102,339	115,984	125,080	134,177	141,000	147,822
E-9	2,482	44,928	66,907	82,964	104,375	120,432	136,490	147,195	157,900	165,929	173,958
E-9	4,064	46,992	114,585	142,086	178,753	206,254	233,754	252,088	270,421	284,172	297,922
Ann Tax Rev. Lost:		856,890	14,180,685	17,584,050	22,121,869	25,525,233	28,928,598	31,197,507	33,466,417	35,168,099	36,869,781

(Continued on next page)

*Multiple pay grades are due to varying years of service (YOS)

Monte Carlo Simulation

DoD Total Tax Revenue lost due to Basic Pay

	Rates	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Participation	0.125	0.155	0.195	0.225	0.255	0.275	0.295	0.310	0.325
	Contribution	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	Growth	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
	Tax Rate	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Pay Grade*	Service Members	Annual Pay 2000	Forecast 2001	2002	2003	2004	2005	2006	2007	2008	2009
W-1	2,451	29,196	42,936	53,240	66,980	77,284	87,589	94,458	101,328	106,480	111,633
W-2	6,305	34,128	129,106	160,092	201,406	232,391	263,377	284,034	304,691	320,183	335,676
W-3	4,102	41,028	100,978	125,213	157,526	181,761	205,995	222,152	238,308	250,426	262,543
W-4	2,065	49,872	61,791	76,621	96,395	111,225	126,054	135,941	145,828	153,243	160,658
W-5	476	59,244	16,920	20,981	26,395	30,456	34,517	37,224	39,931	41,962	43,992
O-1	14,884	23,112	206,399	255,935	321,983	371,519	421,055	454,079	487,103	511,871	536,638
O-1	7,146	24,060	103,160	127,918	160,929	185,687	210,446	226,951	243,457	255,836	268,215
O-2	15,563	34,932	326,188	404,473	508,853	587,138	665,424	717,614	769,804	808,946	848,089
O-2	4,328	36,108	93,765	116,269	146,274	168,777	191,281	206,284	221,286	232,538	243,790
O-2	3,936	36,852	87,030	107,917	135,766	156,653	177,541	191,465	205,390	215,834	226,277
O-3	19,949	40,380	483,324	599,322	753,986	869,984	985,982	1,063,314	1,140,646	1,198,644	1,256,643
O-3	15,221	42,312	386,419	479,159	602,813	695,553	788,294	850,121	911,948	958,318	1,004,688
O-3	15,183	44,424	404,694	501,820	631,322	728,449	825,575	890,326	955,077	1,003,641	1,052,204
O-3	10,879	46,200	301,566	373,942	470,443	542,819	615,194	663,445	711,695	747,883	784,071
O-3	4,733	48,480	137,674	170,715	214,771	247,812	280,854	302,882	324,909	341,430	357,951
O-3	10,821	49,668	322,474	399,868	503,060	580,454	657,848	709,444	761,040	799,737	838,434
O-4	3,343	45,744	91,753	113,774	143,135	165,156	187,177	201,857	216,538	227,548	238,559
O-4	2,098	47,760	60,120	74,549	93,788	108,217	122,645	132,265	141,884	149,098	156,313
O-4	4,645	51,036	142,237	176,374	221,890	256,027	290,164	312,922	335,680	352,749	369,817
O-4	9,820	53,568	315,623	391,372	492,371	568,121	643,870	694,370	744,869	782,744	820,619
O-4	10,511	55,332	348,957	432,706	544,373	628,122	711,872	767,705	823,538	865,413	907,288
O-4	6,716	57,108	230,122	285,352	358,991	414,220	469,450	506,269	543,089	570,704	598,318
O-4	8,174	57,708	283,023	350,949	441,516	509,442	577,367	622,651	667,935	701,897	735,860
O-5	5,975	51,504	184,642	228,956	288,041	332,355	376,669	406,212	435,755	457,912	480,069
O-5	620	53,052	19,735	24,472	30,787	35,524	40,260	43,418	46,575	48,944	51,312
O-5	478	55,908	16,034	19,883	25,014	28,862	32,710	35,276	37,841	39,765	41,689
O-5	497	59,664	17,792	22,062	27,755	32,025	36,295	39,142	41,989	44,124	46,259
O-5	3,445	63,432	131,114	162,581	204,538	236,005	267,472	288,451	309,429	325,163	340,896
O-5	5,821	65,232	227,829	282,508	355,414	410,093	464,772	501,224	537,677	565,017	592,356
O-5	5,195	67,008	208,864	258,991	325,828	375,955	426,082	459,501	492,919	517,983	543,046
O-5	6,622	69,024	274,246	340,065	427,824	493,643	559,462	603,342	647,221	680,130	713,040
O-6	1,231	76,572	56,556	70,130	88,227	101,801	115,374	124,423	133,472	140,259	147,046
O-6	2,076	78,588	97,889	121,383	152,707	176,201	199,694	215,356	231,019	242,765	254,512
O-6	2,925	80,628	141,502	175,463	220,743	254,704	288,664	311,305	333,945	350,925	367,906
O-6	5,087	84,588	258,179	320,143	402,760	464,723	526,686	567,995	609,304	640,285	671,267
O-7	878	108,576	57,198	70,925	89,229	102,956	116,684	125,835	134,987	141,851	148,714
	Annual Tax Revenue Lost:		20,548,527	25,480,173	32,055,701	36,987,348	41,918,994	45,206,758	48,494,523	50,960,346	53,426,169
	Tax Revenue Lost with 4.4% Growth:		21,452,662	27,771,758	36,475,964	43,939,508	51,989,225	58,533,751	62,790,752	65,983,502	69,176,252

*Multiple pay grades are due to varying years of service (YOS)

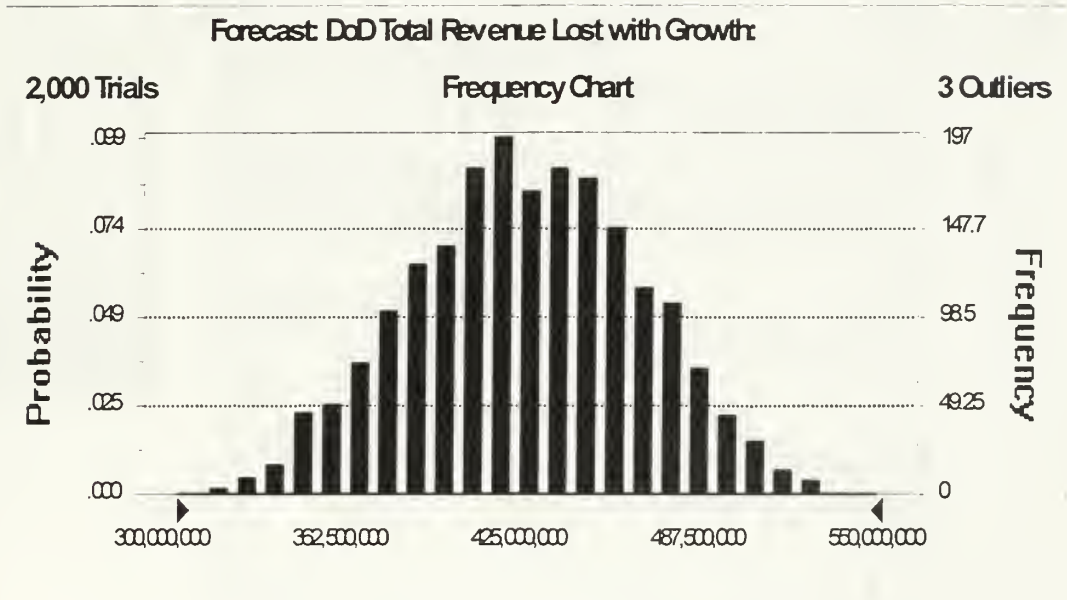
DoD Total Revenue Lost:	355,078,539
DoD Total Revenue Lost with Growth:	438,113,373

Forecast: DoD Total Revenue Lost w/Growth

Summary:

Display Range is from 300,000,000 to 550,000,000
Entire Range is from 289,457,210 to 563,926,286
After 2,000 Trials, the Std. Error of the Mean is 909,971

Statistics:	Value
Trials	2000
Mean	423,813,564
Median	423,835,430
Standard Deviation	40,695,154



Monte Carlo Simulation

Total Tax Revenue Lost due to Bonus Pay

Bonus Type	Probabilistic Contrib Rate	Range of Participation Rates							
		Year 1	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
SRB	0.22	0.10	0.16	0.19	0.22	0.25	0.28	0.30	0.32
ACP	0.29	0.15	0.23	0.27	0.30	0.33	0.35	0.37	0.39
Nuke	0.29	0.15	0.23	0.27	0.30	0.33	0.35	0.37	0.39
SWO	0.29	0.15	0.23	0.27	0.30	0.33	0.35	0.37	0.39
MSP	0.38	0.30	0.36	0.39	0.40	0.40	0.40	0.40	0.40
EB	0.22	0.10	0.16	0.19	0.22	0.25	0.28	0.30	0.32
NUKE	0.29	0.15	0.23	0.27	0.30	0.33	0.35	0.37	0.39
NURSE	0.29	0.15	0.23	0.27	0.30	0.33	0.35	0.37	0.39
	0.03								
	Amt (000s)								
SRB	366,200	357,045	357,045	357,045	357,045	357,045	357,045	357,045	357,045
ACP	375,700	482,775	482,775	482,775	482,775	482,775	482,775	482,775	482,775
Nuke	28,700	36,880	36,880	36,880	36,880	36,880	36,880	36,880	36,880
SWO	21,800	28,013	28,013	28,013	28,013	28,013	28,013	28,013	28,013
MSP	33,600	56,784	56,784	56,784	56,784	56,784	56,784	56,784	56,784
EB	210,800	205,530	205,530	205,530	205,530	205,530	205,530	205,530	205,530
NUKE	3,900	5,012	5,012	5,012	5,012	5,012	5,012	5,012	5,012
NURSE	2,300	2,956	2,956	2,956	2,956	2,956	2,956	2,956	2,956
Annual Tax Rev. Lost:		1,174,993	1,174,993	1,174,993	1,174,993	1,174,993	1,174,993	1,174,993	1,174,993

Total Tax Revenue Lost due to Bonus Pay: 10,574,937

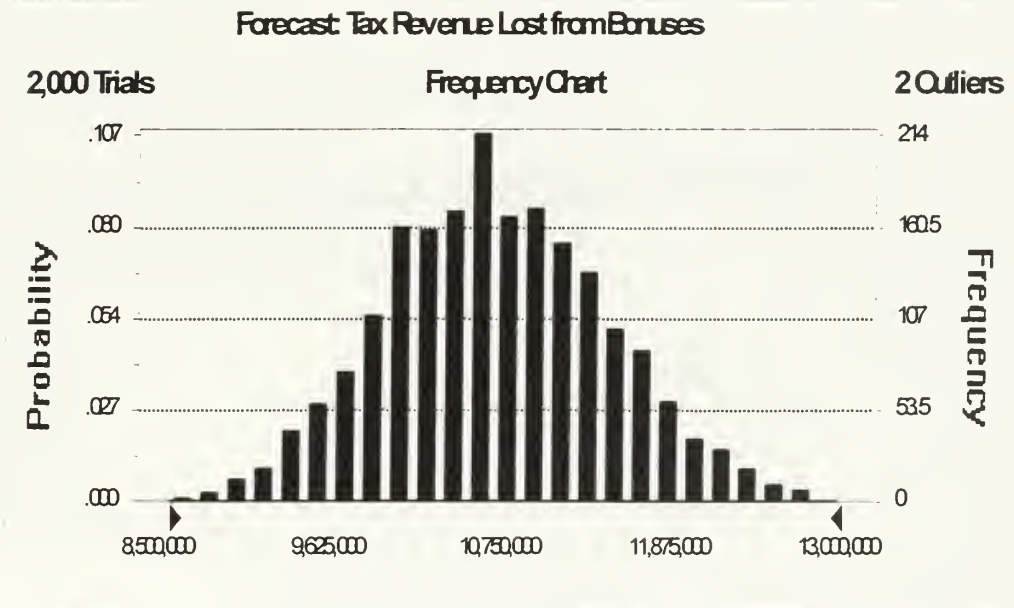
Legend:	
	Selective Re-enlistment Bonus
	Aviation Continuity Pay
	Nuclear officer incentive pay
	Surface Warfare Officer Bonus Pay
	Multi-year Special Pay (Doctors, Health Care Profesionals)
	Enlistment Bonus
	Nuclear Accession Bonus
	Nurses Bonus

Forecast: Tax Revenue Lost from Bonuses

Summary:

Display Range is from 8,500,000 to 13,000,000
Entire Range is from 8,385,035 to 12,820,133
After 2,000 Trials, the Std. Error of the Mean is 16,740

Statistics:	Value
Trials	2000
Mean	10,671,541
Median	10,637,192
Standard Deviation	748,635



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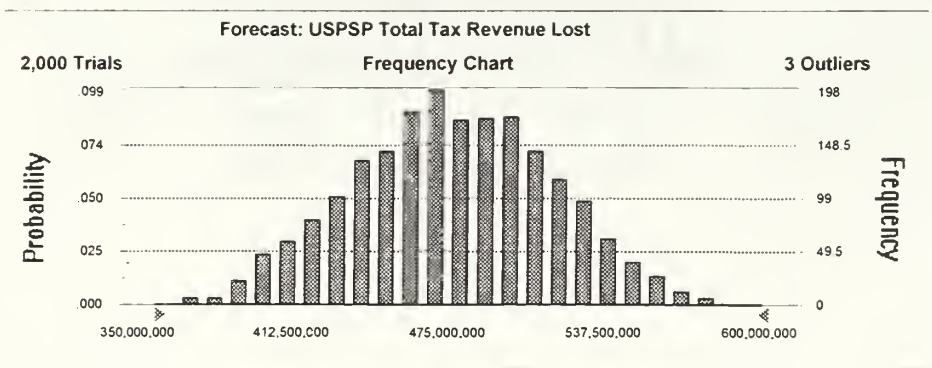
APPENDIX C. THREE POSSIBLE CAUSES FOR TOTAL LOST TAX REVENUE DUE TO THE USPSP

Appendix C analyzes three possible cases based on the last Monte Carlo simulation for total lost tax revenue due to the USPSP. The first set of data results below calculate the USPSP's mean, standard deviation, and frequency chart. The following three sets of data results are based on the decision maker's requirements. Case one uses a range of $400-500 million dollars, case two uses a range of $425-525 million dollars, and case three uses a range of $430-614 million dollars, which equates to approximately one standard deviation (66.7%) from the mean.

Forecast: USPSP Total Tax Revenue Lost

Summary:
Display Range is from 350,000,000 to 600,000,000
Entire Range is from 337,434,126 to 614,077,726
After 2,000 Trials, the Std. Error of the Mean is 911,320

Statistics:	Value
Trials	2000
Mean	**471,606,395**
Median	471,612,655
Standard Deviation	**40,755,477**

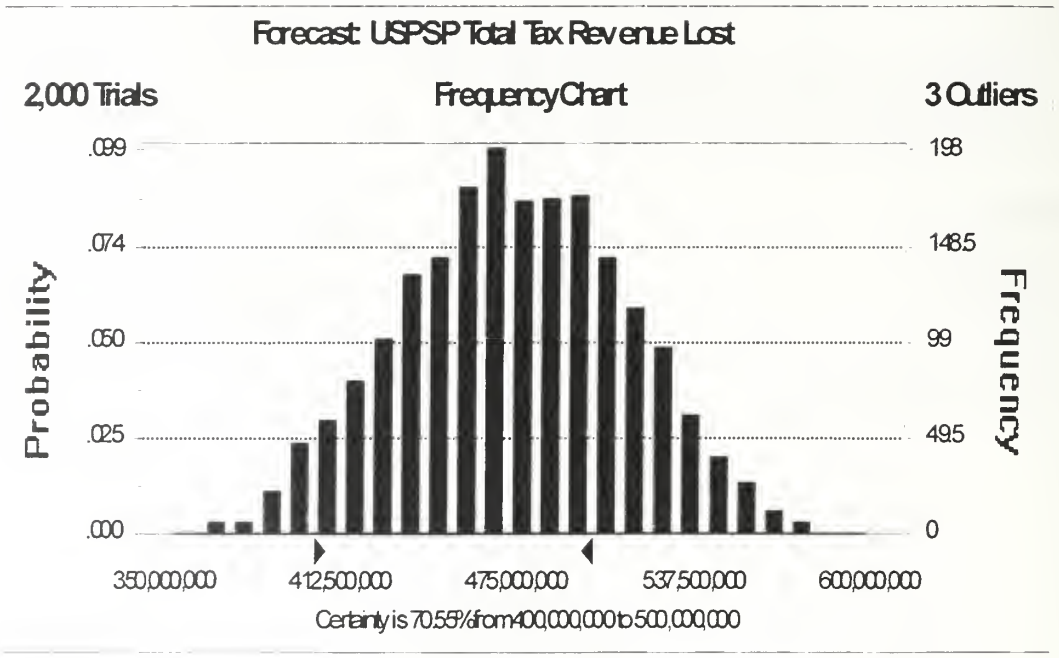


Forecast: Case One: USPSP Total Tax Revenue Lost

Summary:

Certainty Level is 70.55%
Certainty Range is from 400,000,000 to 500,000,000
Display Range is from 350,000,000 to 600,000,000
Entire Range is from 337,434,126 to 614,077,726
After 2,000 Trials, the Std. Error of the Mean is 911,320

Statistics:	Value
Trials	2000
Mean	471,606,395
Median	471,612,655
Standard Deviation	40,755,477

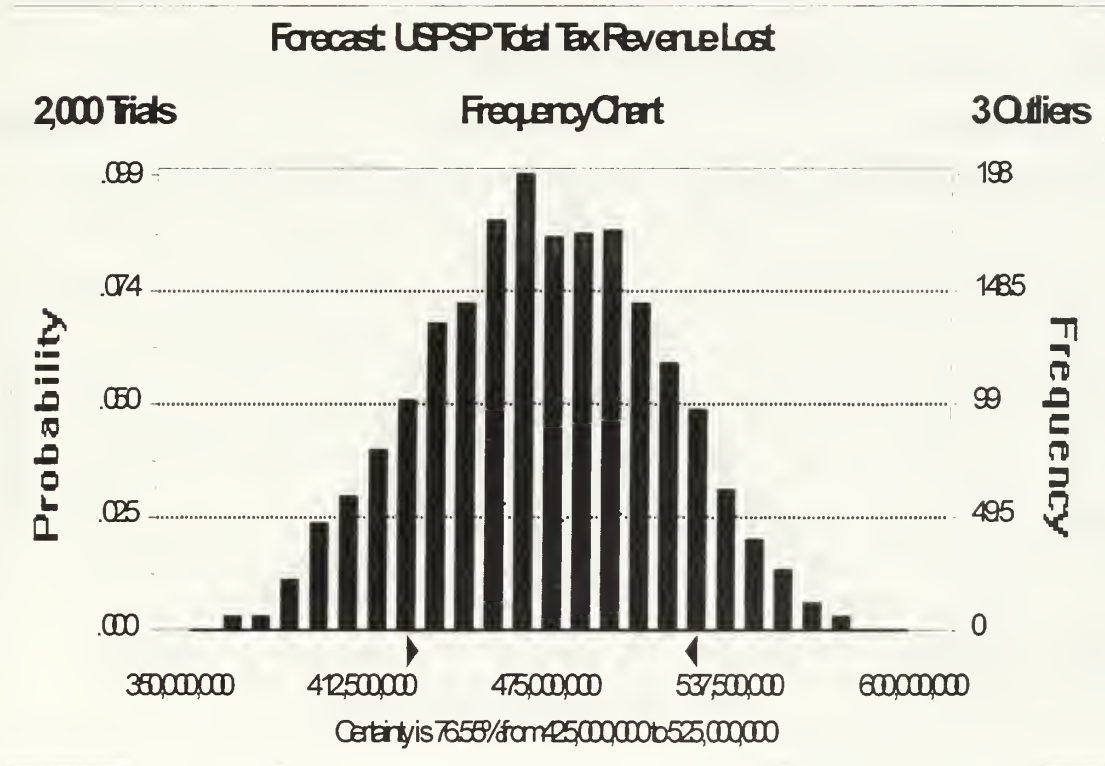


Forecast: Case Two: USPSP Total Tax Revenue Lost

Summary:

Certainty Level is 76.55%
Certainty Range is from 425,000,000 to 525,000,000
Display Range is from 350,000,000 to 600,000,000
Entire Range is from 337,434,126 to 614,077,726
After 2,000 Trials, the Std. Error of the Mean is 911,320

Statistics:	Value
Trials	2000
Mean	471,606,395
Median	471,612,655
Standard Deviation	40,755,477



Forecast: Case Three: USPSP Total Tax Revenue Lost

Summary:

Certainty Level is 66.60%

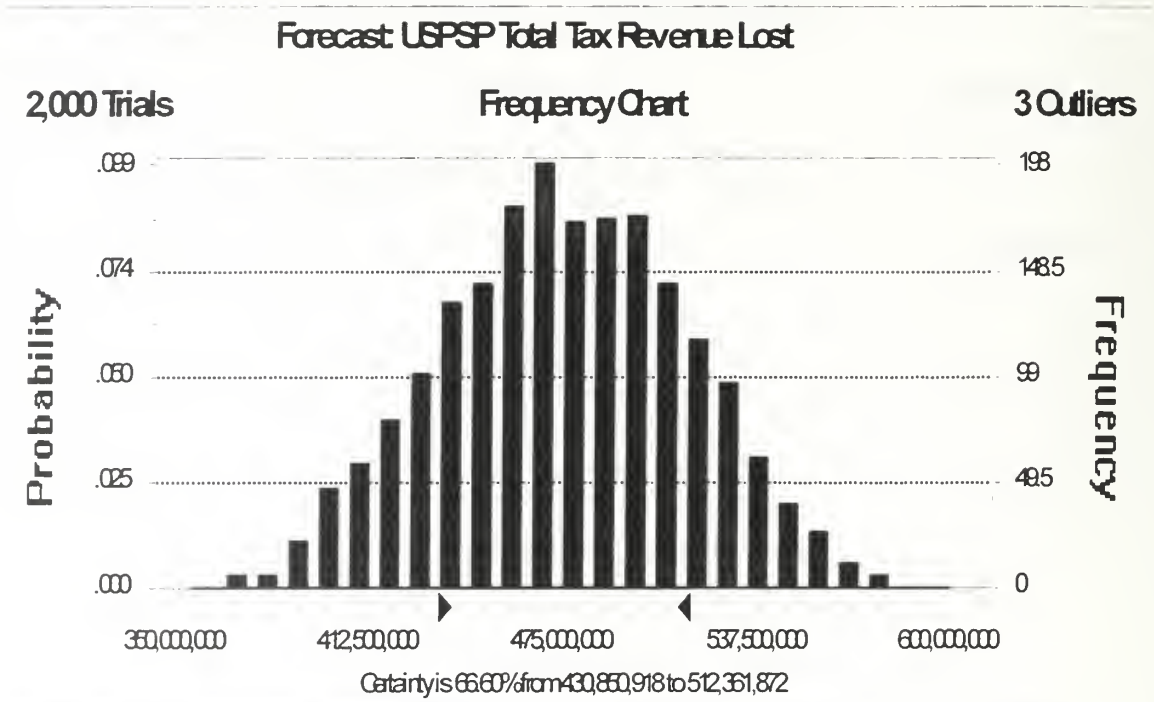
Certainty Range is from 430,850,918 to 512,361,872

Display Range is from 350,000,000 to 600,000,000

Entire Range is from 337,434,126 to 614,077,726

After 2,000 Trials, the Std. Error of the Mean is 911,320

Statistics:	Value
Trials	2000
Mean	471,606,395
Median	471,612,655
Standard Deviation	40,755,477



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